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CONTENTS FOR JUNE 1938

The Function of Deposit Banking	*E. A. Goldenweiser*	303
Trends of Principal Earning Assets and Their Significance	*William J. Carson*	311
The Economic Distribution of Demand Deposits	*Lauchlin Currie*	319
Trends of Bank Earnings and Expenses	*Donald S. Thompson*	327
Some Problems of Bank Supervision	*Homer Jones*	334
New Indexes of Production and Trade	*Norris O. Johnson*	341
A Quarterly Series of Manufacturers' Inventories	*D. C. Elliott*	349
Total Relief and Work Program Expenditures	*Dorothy Fahs Beck*	353
Households and Persons Receiving Relief	*T. J. Woofter, Jr. and T. E. Whiting*	363
Pitfalls in the Field of Statistical Forecasting	*Leon E. Truesdell*	373
The Reliability of Preliminary Price Indexes	*Walter B. Garver*	380
Variations in Family Living Expenditures	*Dorothy S. Brady*	385
Discrete Frequency Distributions	*H. Muench*	390
Comparability of Mortality Statistics	*Theodore A. Janssen*	399
Notes (See Contents Page Inside)		404
Book Reviews (See Contents Page Inside)		455

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JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

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THE FUNCTION OF DEPOSIT BANKING*

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Deposit banking as we know it in the United States has two distinct functions. Banks are a part of the mechanism of capital formation, for they collect the savings of the community and place them in long-term investments. In the exercise of this function, however, banks are not the only or major agency. Their chief and unique function is the creation of deposits through the extension of credit, either in the form of loans or of investments. This is the principal specific duty of banks from the economic point of view because deposits are the country's principal medium of exchange.

There is a group that believes that the capital formation activities of banks on the one hand and their deposit creating function on the other should be separated. Mixing of the two functions, however, is neither the only thing nor the principal thing wrong with our banking system. Furthermore, there is no likelihood of bringing about such a separation for some time to come. For the present we must live with a department store type of banking and I will confine my remarks to the function of banks as they exist today.

GROWTH OF INVESTMENTS

Although deposit creation and capital formation have been the two principal functions of banks for many years, they have shown wide changes in their relative importance. Since 1900 demand deposits at all commercial banks in the country have increased from 4 to 28 billion dollars, a 7-fold increase. Time deposits increased from 1 to 16 billions, a 16-fold increase. The proportion of bank deposits in the form of time deposits, therefore, has gone up from 16 to 36 per cent. All of the time deposits of commercial banks are in investments and in addition they have placed about half of their demand deposits in investments. Investments of commercial banks, since 1900, have increased from 22 to

* Notes on an address at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 27, 1937.

60 per cent of total earning assets, while commercial loans have declined from 49 to 19 per cent. Investments of commercial banks are more than one-half again as large as their time deposits. Salvation of banks must be worked out with reference to these general tendencies.

INDIVIDUAL BANKS AND THE BANKING SYSTEM

In any discussion of the function of deposit banking it is necessary to separate the individual bank from banks as a whole. The individual bank does not create its own deposits, to any extent. It receives deposits in the form of cash or checks and then loans them or invests them. That's why a wise banker once said that you can tell a real banker by the fact that he considers deposits as an asset rather than a liability. To him deposits mean the funds intrusted to him by the public for the purpose of passing them on to others through loans or investments. If this were generally understood, it would clear up a lot of misconceptions. An understanding of this difference between the individual and the group is essential to an understanding of the functions of banks and their responsibilities.

THE INDIVIDUAL BANKER'S RESPONSIBILITY

Individual banks have three separate and distinct responsibilities, which I shall give in order of their importance. The first responsibility of banks is to their depositors. Banks must be prepared to pay in full the deposits that they hold for the public. The establishment of the Federal Deposit Insurance Corporation does not relieve banks of this responsibility. Deposit insurance is only an assurance to the public that the banks will discharge their responsibility to depositors, and deposit insurance could not succeed if the banks neglected this responsibility. Moreover, deposit insurance covers only deposits of $5,000 or less.

Second to safety of deposits comes the responsibility of banks to their stockholders. Banks must endeavor to give shareholders a reasonable return on their capital invested in the bank. The third responsibility of banks is to their community. In order to continue functioning, banks must have the goodwill of their communities. They must be prepared to give the community the service it demands. They must finance local enterprises and perform the various types of services the locality requires. Banks that place all of their funds in safe short-term paper do not fail but neither do they deserve not to fail, for they are not performing the function of community service for which they are created. But banks as a rule do not do this. Most banks place their

funds locally within the limit of safety to the extent that there is a local demand. It is only surplus funds that banks place in balances with their correspondent or in short-term open-market stuff. Banks do this not because of any particular philanthropy. They do it because it is more profitable. Rates on local loans are higher.

In addition to these three general responsibilities of individual banks the large money market banks in the financial centers have a fourth responsibility which is of a national character and which smaller banks can not be expected to carry. Money market banks, as we were aware in the 1920's during the large growth in security loans, have a responsibility of preventing an undue expansion of loans of certain types. These banks must watch not only the growth in the aggregate of loans but also their character. It is not too much to ask that they be conducted with constant reference to broad national developments. But even these banks can be expected to look only at the expansion of certain types of credit. They can not be guided by the total volume of deposits. Concern over the increase or decrease in the volume of deposits is beyond the scope of their activities and responsibilities. It is the function of a Government body.

MONETARY RESPONSIBILITY

From the public point of view, as I have already said, the creation of deposits is the most important function of commercial banks. The volume of deposits must be regulated by national policies pursued by a Governmental body.

The regulation of the volume of deposits can be through influence on earning assets or on deposits themselves. Regulation of the quantity of deposits on the basis of loans and investments presents several difficulties that have not been worked out and there is no expectation of doing this in the immediate future. Loans and investments are in many ways, however, more interesting figures than deposits. They offer an indication of the way in which funds are being used and give clues as to the behaviour of banks and the business community.

Of the different proposals for improving the basis on which reserve requirements are determined, one of the most significant is that of basing requirements on velocity as well as the amount of deposits. This has been subject to detailed critical examination and presents great possibilities, but it also raises real difficulties. I do not mean to say that this proposal has been abandoned, but it is not on the immediate agenda.

A more extreme proposal is requiring reserves of 100 per cent, at

least against demand deposits. In this way complete control of the volume of money, as defined by the school of economists who favor such a proposal, would be in the hands of a Government agency. A germ of real truth as to the behaviour of our monetary mechanism is contained in this proposal, but in my opinion its claims are much too great because of the stress this proposal puts on volume of deposits, or money, whereas the ownership of money and the use to which it is put is fully as important as the volume itself. Although further study of this proposal may reveal how it could improve our present mechanism, it is not immediately feasible because of the many problems it raises.

Our present system is one of fractional reserve requirements equal to 3 per cent against time deposits and 7, 10, and 13 per cent against demand deposits depending upon the location of the bank. These fractional requirements can be doubled under the law, and since the middle of last year the Board has done this, which is as far as it can go. At the present time reserve requirements on demand deposits are as high as 26 per cent against demand deposits at central reserve city banks, and 20 and 14 at other groups of banks.

Fractional reserve requirements have one distinct advantage over 100 per cent requirements, in that the fractional reserves give the monetary authorities a leverage. A reduction of $100,000,000 in reserves, for example, in the absence of borrowing requires a reduction of deposits by 6 times that amount, and conversely an increase of $100,000,000 in reserves exerts pressure to expand deposits by $600,000,000. This leverage has been reduced by the raising of reserve requirements by the Board of Governors. Before that action the ratio of expansion and contraction was 12 of deposits to 1 of reserves instead of 6 to 1. This leverage contributes to making the volume of deposits more responsive to management. Also it leaves more to the play of forces in the market place where supply and demand can come into adjustment. Since we are going to have fractional reserves for some time to come, we must find solutions to our problems within this framework, which will continue over the short run in which we all must live.

LIMITATIONS ON EXISTING POWERS

There is a limitation to attacking the problem through larger reserve requirements, for there is a limit to which banks will have their reserve requirements increased and still stay in the Federal Reserve System. Successful action along these lines is closely tied up with the unification of banking. But some solution will have to be found to this problem, which is the biggest problem today in the monetary system: how can

we effect the transfer into the banking system of the large volume of sterilized gold in a way that will not carry serious inflationary possibilities for the future?

Within such a system the Federal Reserve has a large responsibility to discharge. It has, or should have, sufficient power over the volume of reserves to meet this responsibility. The Federal Reserve has used up a considerable part of its power and in certain conditions would not have enough to handle the situation. Within its present powers the Reserve System can not handle a large gold inflow.

I have had the idea that a solution to this problem of control might be worked out by preventing banks in some way from utilizing reserve funds above a determined amount. There is no doubt that theoretically it would work if there were only one bank, but there are many difficulties in such a system, arising largely from interbank settlements. I feel this difficulty is not insoluble, and we may have to rely upon this scheme some time in the future if it can be developed in a workable way.

GOVERNMENT AND PRIVATE BORROWING FROM BANKS

I want to show you a chart I have had prepared which brings out in a striking way the altered condition of banks in recent years. The solid top line shows the volume of deposits in all member banks since 1920, the lower solid line gives United States Government securities held by banks, and the dash line represents all of their other earning assets exclusive of Governments. The chart shows that following a large growth of private loans and investments and a corresponding growth in deposits during the period of prosperity and speculative expansion in the 1920's, customers of banks rapidly paid off a part of their indebtedness when the break came and banks also liquidated investments. During the depression member bank loans and investments to business were cut nearly in half and the volume of deposits also declined sharply. Beside this contraction that of 1921 appears insignificant, although at that time it looked very big indeed. In the middle of this severe deflation the Government stepped in, sold securities to banks, and spent the proceeds in financing its relief and recovery program. Deposits began to increase rapidly and by the middle of 1936 the money supply of the country was restored.

You can look at the asset side and see the restoration of their volume through the addition of United States Government securities. You can see the creation of Government debt to take the place of reduced private debt. And debt, in our economy, is the obverse of wealth. Or you can look at the liability side and see the restoration of the money sup-

ply through the simultaneous creation of deposits. Or you can look beyond the balance sheet of the banks to the restoration of activity in Government enterprises to take the place of slackening private activity. Whichever way you look at it you will find the national economy restored to a more nearly normal condition by the intercedence of Government spending.

This restoration of the money supply was not necessarily planned as such. In a depression the Government is under the necessity to spend in excess of its income whether it wants to or not. At such times reve-

nues fall off even though expenditures do not increase, and in democracies at such times expenditures are bound to increase. Under these conditions the Government can finance itself by increasing taxes or by borrowing either from the public or from banks. If it could raise taxes and reach funds not in use, national income might be increased by just as much as it would be through an expansion of the money supply, since turning idle money into active money adds as much to the national income as does the creation of money. The same would be true if Government securities were sold to non-banking investors whose funds would otherwise remain idle. But it is not easy to devise taxes that would reach entirely or principally money that is not in use, and

other taxes are restrictive and harmful in a depression. It is also difficult, if not impossible, to tap investment funds that would be sure to remain idle if they were not invested in Government obligations. In addition to borrowing and taxing, the Government can print paper money to meet expenses, but this has obvious disadvantages, which are mentioned a little later. Borrowing from the banks is not only relatively easy at a time when they are eager for earning assets, but has the additional advantage of creating deposits to make up for the preceding decline. This chart is significant because it brings out in a simple way the whole idea of what the Government has done in the monetary field.

CRITICISMS OF BANK HOLDINGS OF GOVERNMENTS

The sale of Government bonds to finance the Federal deficit has at various times been criticized by some bankers because, as they said, banks should not be loaded with the burden of Government securities. I never could see how Government securities could be a burden to the banks when their earning assets were drying up. In fact, they needed the Government securities to make up for the reduction in revenues from other sources. Chairman Eccles, in reference to this particular criticism, once said that it reminded him of a drowning man who complained, when a life preserver was tossed to him, of such interference with his God-given right to drown.

The purchase of Government securities by banks has also been criticised by the purists who believe that banks should lend only for the immediate operation of business. There may be something in banks not holding too many Government securities, but this will probably prove the least of the banking problems that we will have to solve. At all events, the purchase of Government securities by banks has not yet resulted in inflation.

Then there is the anti-interest paying group, especially in Congress, which believes that the Government should make its own money and avoid the expense of borrowing. The chief trouble with the printing press method is that greenback issues would be reserve money and would constitute a basis for a manifold expansion of credit within the banking system. It is a false assumption that the Government can get something for nothing. It is not a choice of paying or not paying for Government expenditures. You have to pay. In borrowing, interest must be paid on the debt. These interest payments are raised through taxation in accordance with our general taxing system, which is based upon ability to pay. If the Government meets its expenditures by paper money, there is no immediate cost, to be sure, but there is also

no market test of the Government's credit and no restrictive limits as to the money it can spend. Under an inflation there would be in the end a cost to be borne by the nation as a whole and this cost would be inequitably distributed. It would be borne on a basis inverse to ability to pay because a rise in the cost of living resulting from inflation falls heaviest on the poor. It is better that the cost of financing the Government be borne through the tax system by those who can do so, rather than that the burden fall on the poorer classes through a rise in the cost of living. Banks perform a useful function in the community; capital invested in them should be permitted to earn a reasonable return. It is much cheaper, nationally speaking, for the country to support a banking system than to do without it.

HOW CAN THE SYSTEM FUNCTION?

To continue to function within the existing economic framework, banks must find earnings and they can do this only by departing from traditional forms. Instead of liquidity, banks must look for soundness of assets and in this search they must render sufficient service to their communities, so that the communities do not feel that they can dispense with the banks. Within this system, the Federal Reserve has the function of (1) regulating the cost and volume of money, although its powers in this respect are inadequate and must be strengthened, and (2) being prepared to liquefy bank assets in case of need, so that the banks may render the services needed by the public and at the same time be protected from adverse consequences of national developments beyond their control. The newly revised Regulation A, recently issued by the Board, marks a recognition of this second function. The Government itself must act as a compensatory agency to support national income when it threatens to contract and to keep up an adequate volume of deposits to carry on the community's business.

What becomes of "laissez-faire" under such a set-up? "Laissez-faire" in fact was never a reality but only a philosophy. It was perhaps nearer to being in operation in the first 14 years of this century than at any other time. Under the impact of war, inflation, and nationalism it has vanished. It has proved not to be a feasible system. Our new philosophy is not "laissez-faire," not freedom to do as we please at any cost; rather it is "laissez-vivre," freedom to live and to function in the interests both of the individual and of society. "Laissez-vivre!" is an accurate slogan, for the lives of millions of people literally depend on the proper functioning of our financial mechanism.

TRENDS OF PRINCIPAL EARNING ASSETS AND THEIR SIGNIFICANCE*

By William J. Carson
University of Pennsylvania

It is nearly a quarter of a century since the establishment of the Federal Reserve system. In that span of time pronounced changes have occurred in the operations and portfolios of American banks. It is the purpose of this article to review the changes in the loans and investments of member banks of the Federal Reserve system over the entire period from 1914 to 1937 and, secondly, to indicate some of the problems that arise from the changes that have taken place.

I

Examination of the course of loans and investments over the period 1914 to 1937 as a whole reveals five shorter periods that were characterized by distinctive banking developments:

(1) 1914 to 1920
(2) 1920 to 1922
(3) 1922 to 1929
(4) 1929 to 1933
(5) 1933 to 1937

The period, 1914 to 1920, as is well known, was dominated by an expansion of bank credit incident to financing the great War. War financing, however, left a definite imprint on bank portfolios. Along with the increase of approximately 100 per cent in total loans and investments of commercial banks in the six year period, the proportion of loans to total loans and investments, as is indicated in Chart I, declined from 76 per cent in 1914 to 69 per cent in 1919. In addition, a large part of the increase in loans that occurred during the period was due to lending on collateral by banks to investors to finance the purchase of securities. As a result of the increased holdings of government securities and increased collateral loans to finance the purchase of securities by investors the decline in the proportion of "commercial" loans in bank portfolios was greater in this period than is reflected in the statistics of total loans and investments given in the chart.

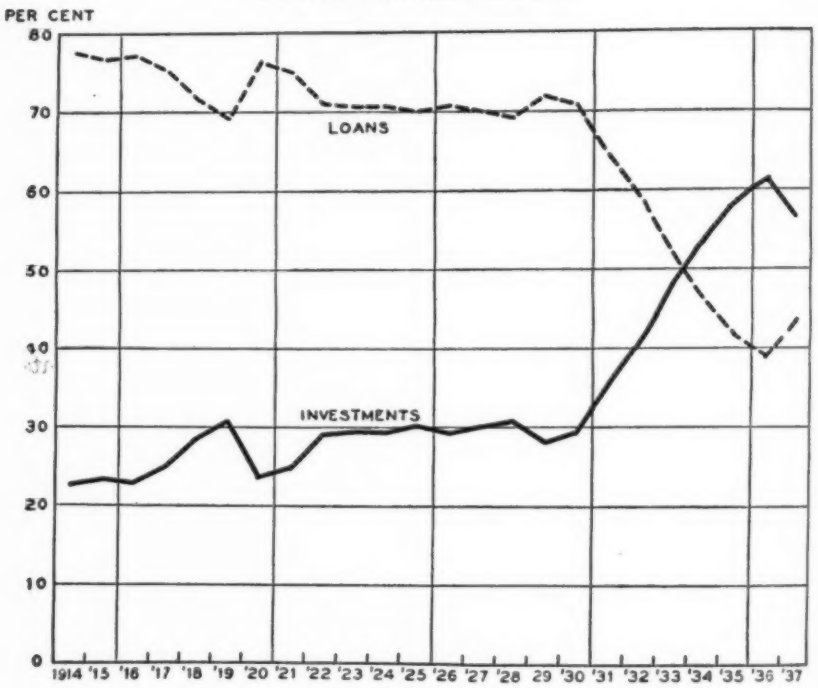
The second period, 1920 to 1922, was the period of post war liquidation. Loans and investments declined slightly from the war-time peaks but the decline was of short duration and by mid-1922 expansion was again under way.

* Condensed from a paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, December 28, 1937.

For the third period, 1922–1929, and for the subsequent periods more detailed information showing the trend of loans by types is available. Types of loans covered by the statistics are (1) loans on securities, (2) loans on real estate and (3) loans of all other types or so-called "commercial" loans. Statistics showing loans classified this way indicate in some detail the types of activity financed by bank loans and the uses to which bank funds are put.

CHART I

PERCENTAGE OF LOANS AND INVESTMENT TO TOTAL LOANS AND INVESTMENTS, ALL MEMBER BANKS, 1914–1937



Source: *Annual Reports of the Board of Governors of the Federal Reserve System.*

Examination of these data, presented in Chart II, shows that the period from 1922 to 1929 was characterized by an increase in the use of bank funds to finance "capital" as distinguished from "commercial" requirements. The proportion of loans on securities, real estate and the holdings of investments combined increased from 52 per cent of total loans and investment in 1922 to 64 per cent in 1929. The proportion of commercial loans declined during the same period from 48 per cent to 36 per cent of total loans and investments. Loans on securities alone

increased from 18 per cent of the total in 1922 to 28 per cent in 1929 while holdings of investments constituted from 29 to 30 per cent of total loans and investments throughout the period.

During the post-war period of the 1920's the trend toward the diversion of bank funds into "capital" as distinguished from "commercial" uses that had been greatly stimulated by war financing continued. An important difference, however, distinguished the post-war years from the period of the war. In the war period bank funds were directed into non-commercial uses as a result of Treasury financing; in the post-war period the forces influencing the diversion were incident to the financing of business enterprise, and of governments, local and foreign, through the securities markets.

In 1929 the rapid expansion of bank credit which had continued for fifteen years following 1914, except for the slight interruption in 1921 and 1922, came to an end. The third period, 1929 to 1933, was one of general credit contraction and liquidation. Total loans and investments declined from $36,000,000,000 in 1929 to $25,000,000,000 in 1933. The decline in loans amounted to nearly $13,000,000,000 while investments increased approximately $2,000,000,000. The decline in loans on securities and in loans of all other types was larger relative to the reduction in total loans and investments, and in 1933 these constituted only 19 and 23 per cent respectively of total loans and investments as compared with 28 and 36 per cent respectively in 1929. The decline in loans on real estate between 1929 and 1933 was relatively much less than the decline in total loans and investments. Holdings of investments increased during the period and in 1933 they accounted for nearly one half of total loans and investments as compared with slightly less than one third of the total in 1929. The increase in investments during this period was due largely to a growth in the holdings of obligations of the United States Government.

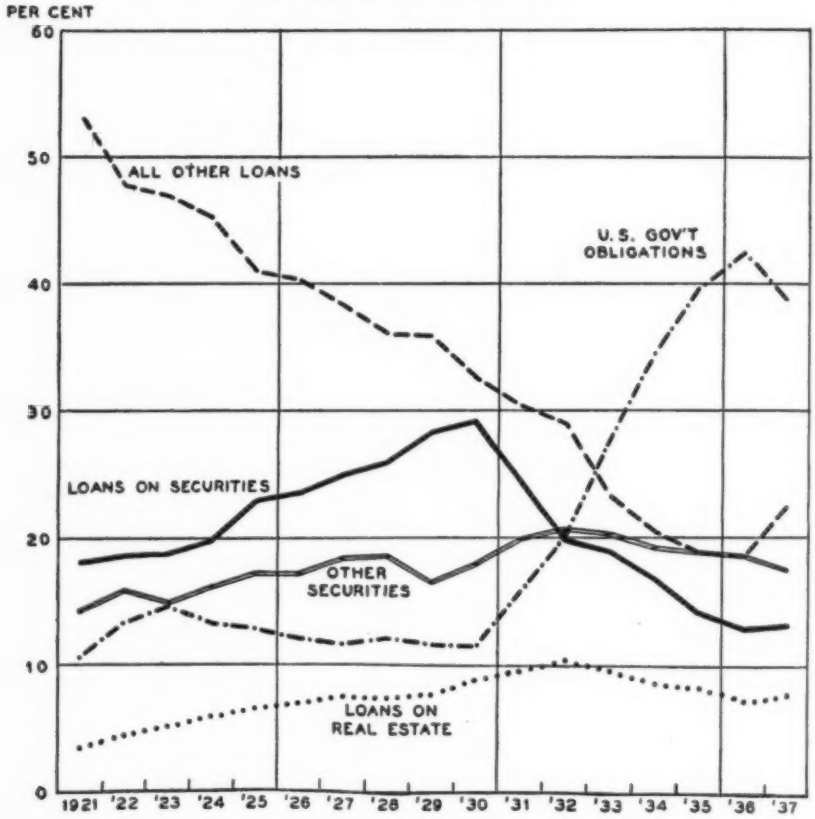
In the final period, 1933 to 1937, the contraction and liquidation which began in 1929 came to an end and a rapid expansion in loans and investments followed. Loans and investments increased from $25,000,000,000 in 1933 to $33,000,000,000 in 1937. Expansion from 1933 to 1936 was due almost entirely to a growth in the holdings of United States Government obligations which increased from $12,000,000,000 in 1933 to nearly $20,000,000,000 in 1936. In 1936 the prolonged rise in bank holdings of United States Government obligations terminated and a sharp increase in loans, particularly in loans for commercial and industrial purposes developed. Between mid-1936 and mid-1937 holdings of United States Government obligations declined approximately

$1,000,000,000 while loans for commercial and industrial purposes increased nearly $1,500,000,000.

As a result of this reversal which began in 1936 and continued in 1937, the proportion of loans increased from 39 to 44 per cent and the proportion of investments declined from 61 to 56 per cent of total loans

CHART II

PERCENTAGE OF LOANS AND INVESTMENTS TO TOTAL LOANS AND INVESTMENTS, ALL MEMBER BANKS, 1921–1937



Source: Figures showing amounts for 1921–1929 given in part in testimony of A. C. Miller of Federal Reserve Board and published in *Hearings on the Operation of the Banking System*, Part I, p. 138; for 1929–1937 figures taken from *Annual Reports of the Board of Governors of the Federal Reserve System* and the *Federal Reserve Bulletin*.

and investments. Nearly all of the increase in loans was in loans to customers for commercial and industrial purposes.

Summarizing the developments in the five periods of the quarter century from 1913 to 1937, the following observations may be made:

1. Three of the five periods were characterized by rapid expansion in earning assets and two by contractions.

2. Expansion from 1914 to 1920 was due largely to borrowing to finance the war. It was mainly in the form of loans on collateral, especially Government obligations but there was some increase in the holdings of United States Government obligations and investments.

3. Expansion from 1922 to 1929 was due to a growth in loans on securities to finance the raising of funds by business enterprise or by local or foreign governmental units through the securities markets.

4. Expansion in the first part of the fourth period, 1933 to 1936, was due to deficit financing by the Federal Government and was in the form of security purchases by banks; in the second part of the period, 1936 to 1937, expansion was due to increased demands by customers to finance commercial and industrial activity.

5. Contraction from 1929 to 1933 was incident to the great depression and was relatively larger in loans on securities and in commercial loans than in other earning assets.

When the changes over the period as a whole are reviewed and the composition of the earning asset portfolios of commercial banks in 1937 is compared with that in 1914 and in 1922, the outstanding changes may be summarized as follows:

1. Between 1914 and 1937 loans declined from 78 per cent to 44 of total loans and investments, and holdings of investments increased from 23 per cent to 56 per cent of the total.

2. Between 1922 and 1937 the important changes in the composition of earning asset portfolios were a shrinkage in the proportion of commercial and industrial loans from 48 per cent to 23 per cent of total loans and investments and an increase in the proportion of the holdings of United States Government obligations from 11 to 39 per cent of the total.

3. Between 1921 and 1929, the proportion of security loans increased sharply but in the years following 1929 these loans declined substantially and in 1937 they were less in proportion to total loans and investments than in 1921.

II

As a result of the changes thus described, fundamental alterations have occurred in the portfolios of American banks over the past quarter of a century. The changes resulted from a variety of forces and their significance is reflected in many ways.

From the standpoint of banking theory, one of the reasons why the changes are significant is because they show that banks today find their role predominantly one of supplying funds to enterprise indirectly rather than directly. During the period of the 1920's this was done to an increasing extent through loans on securities and by the purchase of securities and since 1930 it has been done through the purchase of United States Government obligations. As a consequence the opinion is advanced by some that the liquidity of the portfolios of commercial banks as it was thought to prevail a quarter of a century ago when the Federal Reserve Act was written has been greatly impaired and that the ability of banks of deposit to perform their monetary functions in periods of stress has been greatly weakened. Moreover the extent to which banks are in a position to supervise the uses to which funds are put by enterprise is materally lessened when financing is indirect rather than direct.

To the individual banks, important problems arise in managing portfolios composed largely of investment securities. Testing the soundness and desirability of securities and managing a portfolio of investments is a different problem from that of handling a portfolio of loans to customers to finance commercial, agricultural and industrial transactions. And many banks, particularly the smaller ones, cannot adequately equip themselves for the job.

Another serious problem that is presented to bank management because of increased holdings of securities is that of maintaining earnings. In 1929 total earnings from current operations of all member banks were $2,400,000,000, of which amount $1,500,000,000 were earnings from loans, $473,000,000 were from investments and $363,000,000 were from all other sources. By 1936 total earnings had declined approximately 50 per cent to $1,271,000,000 almost all of which was due to a decline of 66 per cent in earnings from loans to a total of $513,000,000. Earnings from investments in 1936 were about the same as in 1929. Total holdings of investments, on the other hand, were 83 per cent larger in 1936 than in 1929 but the larger holdings did not result in a similar growth in earnings.

EARNINGS OF MEMBER BANKS, 1929 TO 1936
(In millions of dollars)

Year	Earnings			
	Total	On loans	On investments	All other
1929	2,399	1,563	473	363
1930	2,158	1,349	472	337
1931	1,841	1,073	480	288
1932	1,554	851	458	245
1933	1,237	604	426	207
1934	1,244	540	474	230
1935	1,207	498	467	242
1936	1,271	513	487	271

The significance of the changes in earning assets was recognized temporarily by Congress in 1932 in the Glass-Steagall Act and permanently in the Banking Act of 1935 when the Federal Reserve Act was amended by the addition of a provision "authorizing a Federal Reserve bank to make advances to its member banks on any security satisfactory to the Reserve bank at a rate of interest at least one-half of 1 per cent per annum higher than the highest discount rate in effect at such Reserve bank." Commenting upon the significance of this change in the Federal Reserve Act the Board of Governors recently said,

> the broadened provision for borrowing at the Reserve banks is . . . a recognition of the fact that the scope of operations of member banks has changed. Since the passage of the Federal Reserve Act paper that qualified under the eligibility requirements of that act has constituted a decreasing proportion of the loans and investments of member banks . . . Changes in business practices, which have resulted in a decline in the extent of commercial and industrial borrowing from banks, have been partly responsible for this development. Another major factor has been the increase in the amount of savings deposited in member banks. With member banks holding $10,000,000,000 of savings and other time deposits, as compared with about $1,000,000,000 in 1914 they are in a position where both in their own interest and in that of the country they must make considerably larger volume of long-time investments. Such investment is an essential part of the economic process of capital formation. It seems reasonable, therefore, that these assets be given a status which will permit member banks to borrow on them from the Reserve banks when the need arises.[1]

The dangers to the development and maintenance of sound banking practices that may arise from the purchase and sale of securities by banks are likewise recognized as significant by the supervisory authorities. In its annual report for 1936 the Federal Deposit Insurance Corporation comments on current practices of banks with regard to the purchase and sale of securities as follows:[2]

> The Corporation has been viewing with concern the prevalence of speculative practices by banks in handling their investments. Over the past two or three years many banks to an increasing extent have been buying securities with a view to obtaining profits from a rise in the price of those securities, rather than with a view to obtaining reasonable earnings over a period of time. When a bank buys

[1] *Federal Reserve Bulletin*, September, 1935, pp. 560–561.
[2] *Annual Report of the Federal Deposit Insurance Corporation*, 1936, p. 19.

securities with the primary intention of selling them again at higher prices that bank is speculating. Dealing in high grade securities does not alter the essential speculative nature of the transaction. . . .

Over the past few years some banks have been using profits secured from speculation in securities to pay dividends and to retire preferred stock without making adequate provision for possible future depreciation in the securities purchased by them at high levels of prices. So long as banks speculate in securities they can expect at some time to incur losses. The Corporation insists that insured banks should make provision for any depreciation or losses that may occur. To fail to make such provision is to engage in an unsound banking practice. . . .

Finally, the changes in earning assets are significant to the central banking and monetary authorities because of the problems which they present to these authorities in formulating and executing monetary policies. Under present day conditions, when member banks adjust their reserve position to a considerable extent through their investment portfolios rather than by borrowing at the reserve banks, greater consideration has to be given to the possible effect of monetary policies on the holdings of securities by member banks than was the case in earlier periods. At times the investment position of banks may prove advantageous to the monetary authorities in timing and executing policies but under certain circumstances it may be definitely embarrassing. The developments that have taken place present a situation that is relatively new in banking history and of increasing practical importance.

THE ECONOMIC DISTRIBUTION OF DEMAND DEPOSITS*

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Demand deposits could be distributed according to size, banks, geographical regions, or by types of depositors. The present paper is concerned with the last mentioned type of distribution. The distribution of deposits by type of holder is a new field on which data have only recently become available, and the results which I shall present shortly must be regarded as tentative. They do, however, for the first time permit us to ascertain the approximate distribution by broad economic categories of the bulk of the money supply of the country.

Information of this character, could it be made detailed, accurate, and frequent, would, I believe, permit an advance in monetary and business cycle analysis. It appears indispensable if any vitality is to be imparted to the concept of velocity of money as a tool of analysis. It would give quantitative content to such concepts as "liquidity preference," "excess saving," and has some bearing on "the propensity to consume." It would gave the way for a fruitful marriage between the two strands of theory centering on the one hand around the velocity of money, and, on the other, the demand for money.

Until recently it has not been possible to attempt a distribution of demand deposits by economic categories as no basis existed for an estimate of the composition of the single item of cash reported by corporations in the *Statistics of Income*. In addition, banks were included with other finance groups in the reported figures. Through the cooperation of the Treasury both these difficulties have been removed. The Bureau of Internal Revenue forms for corporation balance sheet returns, starting with December 31, 1935, contain separate headings for demand deposits, time deposits, and other cash. In addition, separate figures of the cash holdings of financial groups other than banks were made available.

In the early part of 1936 the Federal Reserve banks, at the request of the Board of Governors, sent questionnaires to the large banks, asking for information relative to their large deposit accounts on October 25, 1933 and November 1, 1935, classified by economic types. It was discovered that the percentage composition as between demand and time deposits obtained from this questionnaire for 1935 agreed

* Revision of a paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 28, 1937.

very well with the percentage composition obtained from the Bureau of Internal Revenue's special compilation for the same economic groups of those corporations that reported a breakdown of their cash item. This strengthened the presumption that the questionnaire sample was representative and the percentage composition of demand and time deposits was therefore applied to the cash item of corporations by industrial groups in the 1933 *Statistics of Income*. Estimates were made of non-corporate demand deposits and figures for other categories were obtained directly from banking reports.

The various steps in building up these distributions were carried out mainly by Martin Krost and a detailed description written by him is available on request. In general the figures for corporations and public bodies are the most reliable, while there may be a considerable margin of error in the estimates for non-corporate holdings. The increase in business balances is probably understated on two counts. In the first place, the abolition of the privilege of filing consolidated returns in 1934 probably means that certain holding companies were listed under business categories in 1933 and under finance in 1935. This would also have the effect of overstating the increase in financial deposits. In the second place, a substantial part of the item "Checks in process of collection between depositors" which represent checks deducted by payers from their reported balances, and not yet credited by payees to their balances, should be credited to business balances. This item increased over one billion dollars between the two dates. Consequently the proportion of the total represented by business balances may actually have changed between these two dates much less than is shown in the table on the next page.

Broadly speaking, it appears that at the end of 1935 business held about a third of the deposit balances in all checking accounts; finance, including foreign individuals, firms and banks and large personal accounts, nearly a fourth; public bodies a fifth. The unclassified residue amounts to slightly more than a fifth but consumers' balances proper are probably not more than a sixth. If currency outside banks were added to checking accounts, the proportions would doubtless be raised for consumers and lowered for other groups. Present data appear too fragmentary, however, to permit a reliable distribution of currency.

Perhaps the best way to illustrate the possible ways in which information on the changes in cash holdings may aid in interpreting business developments will be to consider the significance of the actual changes shown between 1933 and 1935. This period is unique in several respects. In the first place, the very large expansion in demand

deposits was mainly attributable to the Government's borrowing and spending program. Member banks alone increased their holdings of direct and guaranteed Government issues by $5 billion. The next most important single factor in increasing demand deposits was the addition to our gold stocks apart from the gold increment. Secondly, in this period business raised virtually no new money from banks or the capital markets and the problem of tracing the sources of the increase in business deposits is thereby simplified.

ECONOMIC DISTRIBUTION OF DEMAND DEPOSITS
(Amounts in millions of dollars)

	Deposit balances		Per cent to total		Percentage increase
	Dec. 31 1933	Dec. 31 1935	Dec. 31 1933	Dec. 31 1935	
Total demand deposits	17,470	26,600	—	—	+ 52.3
Less items in transit:					
In process of collection by banks	1,200	2,370	—	—	+ 97.5
In transit between depositors	1,200	2,370	—	—	+ 97.5
Total demand deposits, adjusted for transit items	15,070	21,860	100.0	100.0	+ 45.1
Business:	6,120	7,640	40.6	34.9	+ 24.8
Corporations engaged in:					
Manufacturing, mining, construction	2,800	3,450	18.6	15.8	+ 23.2
Transportation, public utilities	980	1,080	6.5	4.9	+ 10.2
Trade, service	1,070	1,420	7.1	6.5	+ 32.7
Miscellaneous*	50	80	0.3	0.4	+ 60.0
Non-corporate enterprises†	1,220	1,610	8.1	7.3	+ 32.0
Finance:	2,670	5,390	17.7	24.7	+101.9
Corporations:					
Insurance	560	920	3.7	4.2	+ 64.3
Other finance	820	1,740	5.4	8.0	+112.2
Non-corporate:					
Security brokers	200	200	1.3	0.9	—
Banks' trust departments	440	1,060	2.9	4.9	+140.9
Foreign banks	130	440	0.9	2.0	+238.5
Other foreigners§	240	600	1.6	2.7	+150.0
Large personal accounts‡	280	430	1.9	2.0	+ 53.6
Public bodies:	2,690	4,130	17.9	18.9	+ 53.5
U. S. Treasury	1,020	1,460	6.8	6.7	+ 43.1
Other public bodies	1,670	2,670	11.1	12.2	+ 59.9
Unclassified—consumer balances, etc.	3,590	4,700	23.8	21.5	+ 30.9

* Includes agricultural corporations and corporations not reporting nature of business.
† Excludes professional service, agriculture, finance, transportation and public utilities.
§ Includes foreign bank deposits with nonmember banks.
‡ Accounts with balances of $100,000 and over reported by the 98 largest member banks.

1. *Consumer or income balances.* The unclassified demand deposits do not correspond with income balances since they include personal balances up to $100,000, many of which might more properly be included in finance. They also include balances of non-profit institutions and other miscellaneous categories. In view, on the one hand, of the substantial increase in the large personal accounts classified under finance and, on the other, of the absence of any increase in currency outside banks, the bulk of which is probably held by consumers, it

seems unlikely that small personal balances accounted for a very large proportion of the increase of $1 billion in unclassified demand deposits. Whatever restrictive influence arose from the addition to demand deposits out of current income on the part of consumers, therefore, must have been of a fairly minor order.

The increase in the total unclassified category may very possibly reflect in large part the sales of securities, as banks, insurance companies, and foreigners added considerably to their holdings of non-Government securities in this period despite the absence of any net increase in outstanding obligations of business and local bodies. The increase in deposits arising from net sales to these categories would not at that time have been restrictive.

Although consumers apparently did not retain in the form of demand deposits any considerable proportion of the increase in their incomes, they did increase their savings deposits by some $2 billion. Ordinarily, because of the resulting lower reserve requirements, the banking system expands its earning assets and the bulk of the savings are thus passed back to the monetary stream. However, under the conditions prevailing in this period of already large excess reserves, it is doubtful if banks expanded their earning assets by any more than they would have had no growth in time deposits occurred. Consequently the growth in time deposits probably represented a restrictive development.

2. *Public balances.* The increase in the Federal Government's balances did not arise from the excess of current receipts over expenditures but rather from borrowings. Since there is no reason to believe that these increased deposits would have been expended if the Government had not borrowed them, the increase should not be regarded as restrictive. The increase in the balances of other public bodies, however, may have in part represented a diversion of tax receipts into sinking funds and other accounts. The indebtedness of public bodies other than the Federal Government remained virtually unchanged in this period.

3. *Foreign balances.* The increase of $600 million was probably associated with the inflow of gold and hence was not restrictive.

4. *Financial deposits.* Although, as previously indicated, the increase in financial deposits may be overstated owing to the change in classifications arising from the abolition of consolidated returns in 1934, still the increase was substantial. It does not appear that it can be attributed to a net sale of securites or by redemptions. Life insurance company holdings of the securities of non-public bodies increased by over $500 million in this period. There is some indication that business

redeemed more bonds than it issued, although not to an amount comparable with the indicated increase in financial deposits. It is possible that a part of the increase in financial deposits may be attributed to the refinancing of mortgages by Government agencies but the bulk of such refinancing took the form of exchanges of Government guaranteed bonds rather than cash for mortgages. Even allowing for these and other types of debt redemptions it would still appear that a substantial portion of the increase in financial deposits must be attributed to some individuals' failure to spend all of their large salaries, the failure of insurance companies to invest all of their current receipts, and the failure of individuals and institutions to spend or invest all of their interest and dividends. In other words, the increase in these balances represented in part a withdrawal of funds from the monetary income-disbursement stream and was a restrictive factor.

5. *Business balances.* In accounting for the increase in business balances we may proceed by a process of elimination:

(a) It was not attributable to increased borrowings from banks or from other sources. The net long-term indebtedness of all business units probably declined in this period. A comparison of the funded debt of 530 industrial corporations on December 31, 1933, and December 31, 1935, indicated a decline of $251,000,000. The holdings of marketable securities of the same corporations, however, also declined by $356,000,000. The cash holdings of this particular group of corporations increased from $1.6 billion to $2 billion.

(b) It is highly doubtful if the repatriation of capital on the part of American business could have occurred in an amount sufficient to account for more than a small part of the increase in business deposits. It is believed that the great bulk of the inflow of capital was for the account of foreigners.

(c) Finally, in view of the recovery movement and the extension of time and installment sales, it appears improbable that any excess of cash could have come about through a decline in the net indebtedness of individuals to corporations.

We arrive, therefore, at the conclusion that the major part of the indicated increase in business deposits must be attributed to the retention of receipts from sales of goods and services. It is perhaps possible to push this stage of the analysis one step further. Current receipts of business cover costs and profits, if any. Since labor and material costs, representing actual out-of-pocket expenditures, increased in this period, it would appear that the increase in business deposits is either a reflection of a failure to disburse money to the full amount represented by such costs as depreciation, bad debts, and loss on sale

of capital assets, or to the full amount represented by profits, or both.

We may now seek to relate the above discussion of the sources of increases in different classifications of balances to a broad interpretation of business developments in the period under discussion.

The Federal Government disbursed funds which came in part from consumer, business and financial deposits, and in part from deposits newly created by the banking system. These disbursements were partly for refinancing purposes but mainly for purposes which directly increased the buying power of individuals. A previous unpublished study by Mr. Martin Krost and the present writer indicated that the net activity-increasing expenditures of the Federal Government amounted to over $6 billion in this period. This figure was obtained by adding together those expenditures of the Government which appeared to increase spending and business activity directly and subtracting tax receipts (except estate and gift taxes) which might be held to decrease spending and business activity. The actual net activity-stimulating figure is doubtless higher, since it is unlikely that the collection of corporate and personal income taxes in this period decreased private spending correspondingly.

Those funds disbursed by public bodies which went directly into people's incomes were probably used in large part to purchase goods and services, in part used to liquidate past indebtedness and in part "saved." Of the part saved, in turn, a portion was probably added to demand deposit balances, a portion to time deposits, and a portion went into financial deposits via insurance companies and purchases of stocks and bonds. A part of the resulting increase in financial deposits was again borrowed by the Government and respent.

The larger portion of Government disbursements to individuals which was spent directly for goods and services was in part disbursed in turn by business in the production of more goods and services, in part used by business to liquidate indebtedness, and in part was added to business balances. The same was doubtless true in the case of direct disbursements of public bodies for supplies and materials. Thus, business was able to add to its balances, refrain from borrowing, and at the same time increase its production and its disbursements to the factors of production. A portion of business disbursements was retained by consumers, finance and possibly non-Federal public bodies.

The increased disbursements of business increased incomes and the demand for goods, but the increased disbursements were in response to previous increases in demand. The process may be viewed as (a)

an increased demand for the products of industry arising from the incomes earned by the factors of production, plus the incomes derived from Government spending, and (b) a further increase in demand resulting from the increased disbursements of business in response to the initial increase in demand. The wave-like movements of business were doubtless due largely to inventory changes, but we are here concerned with the broad upward movement. The continuation of activity-stimulating expenditures of the Government was necessary because the initial impetus of Government spending quickly lost its momentum in the conditions prevailing in this period. A portion of the receipts of both business and consumers remained unspent.

This interpretation of business developments is consistent with (a) the indicated increase in consumer, business and financial deposits, (b) the increase in the national income and production, and (c) the failure of business to borrow and spend the current savings of the community. The increase in deposits of all groups was made possible in very large part by the borrowing and spending by the Government of newly created deposits. Business was able to increase both its disbursements and its balances because a substantial portion of the income devoted to the purchase of the products and services of business was not derived from the disbursements of business but from those of the Government. The failure of business to borrow the current savings of the community did not lead to a decline in incomes, since the current savings were in large part borrowed by the Government and passed back by it into the income stream. The collection and spending of corporate and personal income taxes and estate taxes by the Government resulted in a reduction of idle balances in the hands of taxpayers rather than a reduction of taxpayers' expenditures.

Unless we account for the excess of business sales over disbursements in terms of the increase in incomes due to Government spending, we will be forced to the view that consumers not only spent all their incomes derived from business on the products of business, but, in addition, drew down their balances and/or borrowed, and/or sold securities to institutions or savers—in short, that the savings of consumers were a negative quantity. In view of (a) the direct evidence that Government spending increased some persons' incomes and (b) the indirect evidence of saving on the part of consumers, we are forced to reject the hypothesis that increased business disbursements constituted the motivating force in the recovery movement. The assumption that throughout all this period the fiscal policies of the Government were causing the income of the community to be in excess of the disbursements of business to the factors of production plus the

payment of taxes, appears to be necessary to explain the concomitant increase in consumption and unexpended savings.

There were, of course, other factors in the situation. We are here, however, concerned with the broad picture and it is difficult to reconcile the various observable facts without placing heavy emphasis on the part played by the Federal Government in bringing about an increase in incomes and expenditures in the period under discussion.

My main purpose in the preceding discussion has been not so much to interpret a particular period as to illustrate how information of the character under discussion might be useful. If space permitted, other illustrations might be offered bearing upon the adequacy of a given volume of money to support an anticipated level of activity, upon the course of interest rates, upon the shifts in balances as between different economic groups that may be expected to occur in different phases of the business cycle, and the implications and repercussions of such shifts. For instance, if it is found that the balances of public bodies and finance are abnormally high in the depression phase of the cycle it may be anticipated that they will be gradually drawn down to more normal levels and shifted into industrial and personal holdings as recovery proceeds. Thus, the increasing monetary requirements of business and consumers incident to an expansion of production and incomes may be met without necessarily entailing a rise in interest rates or the creation of new money. Similarly, a shift into financial deposits in the peak or early recession phases of the cycle may be a very deflationary development taking place under cover of an unchanging volume of money. This brings us back to the remarks at the beginning of this paper to the effect that data on the distribution of money would permit a significant advance in the understanding of the factors reflected in changes in income velocity.

TRENDS OF BANK EARNINGS AND EXPENSES*

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The present paper deals with the following points: (1) determination of factors affecting the trend of bank earnings; (2) measurement of the profitability of banking operations; (3) influence of size upon the profitability of banking operations; and (4) problems relating to the study of losses on assets.

Determination of factors affecting the trend of bank earnings. There are a number of factors which are believed to affect bank earnings. Among them may be mentioned size of bank; geographic location; size of community; income of community; economic characteristics of area served; competitive situation, whatever that may mean; type of business, as measured by distribution of assets and liabilities and relative importance of different sources of earnings; risk involved in type of business done; capital ratios; type of bank, that is, whether independent unit bank, branch bank, or member of a group or chain; and class of bank, that is, national, State bank member of the Federal Reserve System, commercial bank not a member of the Federal Reserve System, and savings banks.

Our intensive work has been confined chiefly to data for the years since 1934 collected from 7,500 insured commercial banks not members of the Federal Reserve System. After preliminary study of the data for 1934 and 1935 the conclusion was reached that if worth while results were to be obtained, ratios would have to be computed for each individual bank and the distribution of the individual ratios analyzed. Consequently, for 1936, about 40 balance sheet and earnings ratios were computed for each bank, punched cards were made up and frequency distributions obtained by mechanical sorting.

There are important limitations upon the data and, consequently, upon the results which may be obtained from them:

(a) The nature of bank accounting records and practical limitations upon the type of data which may be collected from those records seriously limit the applicability of the material to numerous problems;

(b) The data relate only to a short period of time, for the most part one year. This shortcoming will be remedied as fruitful parts of the investigations are carried forward;

(c) The data relate only to one class of bank, insured banks not

* Revision of a paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 28, 1937.

members of the Federal Reserve System. This class of bank constitutes more than one-half by number, but holds only about one-seventh of the assets, of all of the so-called commercial banks. The sample is biased, therefore, as to size of bank and possibly as to other characteristics.

The results of our study, therefore, may have corresponding biases. Whether or not we shall attempt to analyse the data for national banks and for State banks members of the Federal Reserve System, I do not know. It is a big job. I earnestly hope that whoever may undertake the analysis of these data will do a sufficiently comprehensive job to test thoroughly conclusions which may be reached. In my opinion, results which may be obtained in this field by short-cut methods are more apt to be misleading than revealing.

Measurement of the profitability of banking operations. It appears to be relatively easy to measure for any period of time the profitability of the operations of any group of banks for which the data may be available. But to measure profitability to any purpose and to obtain results from which valid generalizations may be made is extremely difficult.

Banks report their earnings, expenses, and net earnings (or deficits) from current operations. These data are supposed to reflect only income and expenses arising out of those types of operations which normally recur from year to year. In addition, banks report in separate categories unusual income in the form of profits from the sale of assets and in the form of recoveries on assets previously written down on the books or charged off. They also report in separate categories losses actually sustained or expected to be sustained on assets and any unusual amounts of depreciation.[1]

Net profits are determined by adding to net current operating earnings all recoveries and profits on assets and deducting all losses on assets. Net profits, therefore, reflect to a considerable extent irregular and nonrecurring items, which, for any year or group of years, may include unusual factors. Before general conclusions can be drawn from such data regarding the profits of banks we must be sure that the periods covered are representative and that the unusual factors average out to a fairly typical experience. Except for use in a few very simple analyses the data available for the study of net profits do not appear adequate to permit of useful generalizations. Most of the studies which have been made to date must be accepted with so many reservations as to make them of doubtful value.

[1] In reporting to their respective agencies national banks and State banks members of the Federal Reserve System report all depreciation under the separate heading of losses and do not treat ordinary and regularly recurring depreciation as an expense.

In measuring profitability of banking operations the most useful procedure is to analyze separately the recurring and nonrecurring items, establish general conclusions regarding the recurring items, do what one can with the nonrecurring items and attempt to fit the nonrecurring items into the picture with a series of assumptions. The figures relating to regularly recurring items of earnings and expenses and to net current operating earnings seem to follow fairly consistent patterns and consequently yield readily to statistical analysis. The data of recoveries and profits on assets and of losses and unusual depreciation are too erratic and the pertinent factors too involved to yield easily to analysis, given the data and techniques that we have.

Size as a factor in earnings. Size has been considered an important factor in determining the profitability of bank operations. Analysis made thus far of available data, however, does not appear to me to support the thesis that there is a definite correlation between size of bank and profitability. Table I shows for 1934, 1935, and 1936 net current operating earnings per $100 of total assets of insured commercial banks not members of the Federal Reserve System, grouped according to size, as measured by their deposits. In 1935 and 1936 the rate of net earnings on total assets declined as the size of the bank increased.[2]

TABLE I

NET CURRENT OPERATING EARNINGS PER $100 OF TOTAL ASSETS, INSURED COMMERCIAL BANKS NOT MEMBERS OF THE FEDERAL RESERVE SYSTEM, CALENDAR YEARS 1934, 1935, AND 1936

	Number of banks			Net current operating earnings*		
	1934	1935	1936	1934	1935	1936
All banks	7,379	7,508	7,460	$0.87	$1.07	$1.18
Banks with deposits of—†						
$ 100,000 or less	1,186	898	741	.73	1.25	1.39
$ 100,000 to $ 250,000	2,492	2,406	2,327	.85	1.23	1.36
$ 250,000 to $ 500,000	1,720	1,909	1,998	.85	1.21	1.29
$ 500,000 to $ 1,000,000	1,021	1,193	1,238	.87	1.15	1.26
$ 1,000,000 to $ 2,000,000	585	660	701	.87	1.08	1.15
$ 2,000,000 to $ 5,000,000	255	314	332	.93	1.06	1.13
$ 5,000,000 to $10,000,000	116	124	{76}	.91	1.00	{1.24}
$10,000,000 to $50,000,000			{43}			{1.11}
More than $50,000,000	4	4	4	§	§	§

* Amounts per $100 of total available funds for 1934 and of total assets for 1935 and 1936. For 1934 and 1935 condition figures are as of December 31; for 1936 they are averages of end-of-month figures.

† For 1934 and 1935 deposits are as of December 31, for 1936 deposits are averages of end-of-month figures.

§ Figures are not representative and have therefore been omitted.

Note: Data are for banks operating throughout the entire year.

The same tendency is shown by figures for 1935 of banks members of the Federal Reserve System. The figures are presented in Table II.

[2] For 1934 the relationship was the reverse. The difference in trend may be due to errors in the figures which are believed to be substantial for that year.

TABLE II
NET CURRENT OPERATING EARNINGS PER $100 OF TOTAL ASSETS OF INSURED COMMERCIAL BANKS, CALENDAR YEAR 1935*

	Number of banks	Net current operating earnings			
		All banks	Members F. R. System		Not members F. R. System
			National	State	
All banks	13,847	$0.88	$0.88	$0.82	$1.07
Banks with deposits of—†					
$ 100,000 or less	965	1.27	1.45	1.43	1.25
$ 100,000 to $ 250,000	3,045	1.22	1.19	1.16	1.23
$ 250,000 to $ 500,000	3,242	1.19	1.17	1.08	1.21
$ 500,000 to $ 1,000,000	2,720	1.12	1.10	1.13	1.15
$1,000,000 to $ 2,000,000	1,799	1.08	1.08	1.06	1.08
$2,000,000 to $ 5,000,000	1,240	1.04	1.02	1.10	1.06
$5,000,000 to $50,000,000	727	.90	.88	.90	1.00
More than $50,000,000	109	.79	.80	.78	§

* Amounts per $100 of total deposits plus total capital account in the case of national banks and State banks members of the Federal Reserve System and of total assets in the case of banks not members of the Federal Reserve System.

† Deposits are as of December 31, 1935.

§ Figures are not representative and have therefore been omitted.

Note: Data are for banks operating throughout the entire year.

For the years 1926–30, inclusive, the Federal Reserve Committee on Branch, Group, and Chain Banking compiled data of earnings of national banks grouped according to size as measured by loans and investments. Table III shows data derived from figures presented in the Committee report.

TABLE III
NET EARNINGS AND NET PROFITS PER $100 OF TOTAL DEPOSITS PLUS TOTAL CAPITAL ACCOUNT, NATIONAL BANKS, 1926–1930

	Number of banks	Net earnings	Net profits
Banks with loans and investments of—			
Less than $150,000	353	$1.32	$0.02
$ 150,000 to $ 250,000	741	1.58	.38
$ 250,000 to $ 500,000	1,619	1.68	.63
$ 500,000 to $ 750,000	1,053	1.80	.88
$ 750,000 to $ 1,000,000	725	1.77	.91
$ 1,000,000 to $ 2,000,000	1,330	1.74	.98
$ 2,000,000 to $ 5,000,000	1,019	1.74	1.04
$ 5,000,000 to $10,000,000	312	1.65	1.04
$10,000,000 to $50,000,000	211	1.60	1.06
$50,000,000 or more	40	1.63	1.16

Figures for individual years show that in 1926 and 1927 the most profitable national banks were those with loans and investments of $750,000 to $1,000,000; in 1928 and 1929 the most profitable were those with loans and investments of $500,000 to $750,000; and in 1930 the most profitable had loans and investments of $250,000 to $500,000. In 1935 the most profitable group of the national banks was the group with deposits of $100,000 or less. The most we can say about these figures is that they are not sufficiently conclusive to show any

correlation between size of bank and profitability as measured by the rate of net earnings on assets.

In contrast with net earnings, net profits presented in the last column of Table III tended to increase with an increase in size of bank. The difference is due primarily to the varying loss experiences of the banks which in turn appear to reflect the economic circumstances under which the banks operated.

The figures of small banks are dominated by figures of banks in agricultural and rural regions, particularly in the Midwest and South. The figures of large banks are dominated by figures of banks in industrial and financial centers, particularly in the North and East. During the period 1926–30 banks in the agricultural regions were still feeling the effects of post-war adjustments in agriculture. Many of the banks' loans were in default and the banks were taking substantial losses on assets which had gone sour. Industry and finance, on the other hand, were active and prosperous. The large industrial banks had recovered from the crisis of 1920 and were happily financing the new era in which losses did not exist and never were to be!

The loss experience of the larger banks was characteristic of a period of prosperity; that of the small banks appeared to be characteristic of a period of depression. It seems, certainly in retrospect, that the situation was not at all a characteristic one and was of such a nature as to result in an unfavorable showing of small banks as compared with large banks.

Some support is afforded this position by figures of country and city national banks for the decade of the twenties and for recent years. The most recent data for national banks reveal a tendency for losses on assets of both country and city national banks to approximate each other.

Size of bank and profitability of invested capital. Figures of insured banks not members of the Federal Reserve System show that there is little, if any, causal relation between size of bank and the rate of net earnings on invested capital. If there is causal relation it is so complex and so involved with other factors that it will be a long time before it is successfully measured. Data for State banks members of the Federal Reserve System also reveal no correlation between size of bank and profitability of invested capital. Figures of national banks show a tendency for the ratio of net earnings to total capital account to average lower in small banks than in large banks, the smallest banks averaging less than $5.00 and the very large banks approximately $8.00 per $100 of total capital account. The Federal Reserve Committee on Branch, Group, and Chain Banking obtained somewhat similar results for national banks during the period 1926–30.

It cannot be concluded from the data for national banks, however, that there is necessarily any causal relation between size and profitability. We have ascertained that in the smaller banks generally the capital accounts are a larger proportion of total assets. The data shown in Table IV would appear to indicate that the relationship of total capital account to total assets was much more important in determining the profitability of capital as measured by net current operating earnings than was size of bank.

TABLE IV

NET CURRENT OPERATING EARNINGS PER $100 OF TOTAL CAPITAL ACCOUNT OF INSURED COMMERCIAL BANKS NOT MEMBERS OF THE FEDERAL RESERVE SYSTEM, CALENDAR YEAR 1936

	All banks	Banks with ratios of total capital account to total assets of—				
		10 per cent or less	10 to 20 per cent	20 to 30 per cent	30 to 40 per cent	40 to 90 per cent
All banks	$8.89	$13.35	$9.15	$5.88	$4.53	$4.00
*Banks with deposits of—**						
$ 100,000 or less	6.05	12.28	8.19	5.57	4.23	3.78
$ 100,000 to $ 250,000	8.31	12.36	9.04	6.19	4.85	5.77
$ 250,000 to $ 500,000	9.81	12.93	9.60	6.25	5.40	5.48
$ 500,000 to $ 1,000,000	9.97	14.32	9.36	5.48	4.90	2.50
$ 1,000,000 to $ 2,000,000	9.31	13.90	8.65	4.75	4.17	.50
$ 2,000,000 to $ 5,000,000	8.61	12.21	8.19	5.54	4.58	2.50
$ 5,000,000 to $10,000,000	9.36	12.75	9.52	5.10	5.63	—
$10,000,000 to $50,000,000	9.76	15.19	7.92	4.38	4.58	—
More than $50,000,000†	—	—	—	—	—	—

* Deposits are averages of end-of-month figures.

† Figures for this group are not representative.

Note: Data are for banks operating throughout the entire year.

Losses on assets. Our data appear to be inadequate for satisfactory analysis of losses on assets. On the basis of available data for national banks it has been possible to estimate the average annual rate of loss less recoveries on assets over a long period of time. The data do not reveal the extent to which banks suffer loss on different types of assets, nor are they available in such form and for such periods as to enable us to ascertain what the normal loss experience is. It is impossible to ascertain what the net return to a bank on different types of credit risks is. We know that for national banks during the period 1918–36 the rate of loss on total securities was about the same as on total loans, or at an annual average rate of approximately 1 per cent per annum. We do not have adequate data, however, regarding the types of loans on which losses are taken and consequently the differentials in rates necessary to cover the various degrees of risk in various types of loans. This appears to be a matter of some importance in dealing with adjustments in interest rates, particularly when we realize that under the stress of competition institutions may through one device

or another cut rates to a level that will cover costs and profits but not risk.

In the case of securities it has been possible on the basis of a few assumptions to estimate within reasonable limits the difference in rates of loss between certain classes of securities of a recognized high grade and other securities. On the basis of these studies, it appears that a differential in yield of not less than 1½ or 2 per cent was necessary in order to assure the same net yield on the two classes of securities. These figures are only tentative and, unfortunately, we cannot go beyond this point with our present data. It is not possible to ascertain, for example, the difference in loss that has actually been taken on different types and qualities of securities by banks of different characteristics, in different localities, and operating under different conditions. This does appear to me, however, to be an important subject for investigation.

The rate of loss on securities other than those issued by the United States Government appears to have averaged approximately twice the rate of loss on loans. If the change in bank assets which has been observed in recent years persists and banks continue to hold larger and larger proportions of such securities, it would seem that the quality of such securities held by the banks must be materially improved. Net current operating earnings of the banks are not at a level sufficiently high to absorb a 2 per cent loss ratio on any large proportion of assets.

These figures, crude as they are, throw some light upon supervisors' concern over the practice of banks of trading in securities and paying dividends from the profits thereon. When a bank sells some securities at a profit, but buys others of comparable quality, there has been an increase in total book value but no essential change in par values of the securities held. When this procedure is followed by payment of dividends predicated on profits from the sale of securities, cash assets are reduced and the essential strength of the bank's position is weakened. Over the long period we can expect banks as a group to take losses on securities that are at least as great as their profits on securities.

SOME PROBLEMS OF BANK SUPERVISION*

By Homer Jones, *Division of Research and Statistics*
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Bank supervision has existed for a variety of purposes. When bank notes constituted a sizable portion of the circulating medium of the country, such supervision was conceived of primarily as a means of regulating the quality of the currency. It might be supposed that when bank deposits were substituted for bank notes as the chief part of the country's currency, the main purpose of bank supervision became control of this new circulating medium. Actually, however, it appears that the supervision of the last fifty years has been conceived of primarily as a device for assuring minimum safety standards for a certain class of wealth. Supervision of commercial banks has rested upon essentially the same bases as the supervision of mutual savings banks, building and loan associations, and life insurance companies. Together, these constitute a class of business institutions in connection with which the public early decided that the rule of *caveat emptor* could not properly apply. Supervision of these financial institutions has attempted to control the quality of an economic service or commodity. Thus, bank supervision has fallen into that category of government functions which involves the standardization of commodities or services.

FEDERAL DEPOSIT INSURANCE AND BANK SUPERVISION

The preoccupation of bank supervision with the interests of bank customers, particularly depositors, has been somewhat altered by the introduction of Federal insurance of bank deposits. In so far as their deposits are insured, most depositors have relatively little interest in the quality of the banks with which they deal. As of January 1, 1934, the fundamental *raison d'etre* of bank supervision changed. Previously, bank supervision was a service directly to banking customers. Since that date, bank supervision has become primarily a device whereby the government protects a government corporation from undue loss. This change does not necessarily mean that the socially desirable standards of bank supervision should now be higher than they should have been in the previous situation. The need for fireproof buildings is not greater when fire insurance is in operation than when it is non-existent. But, despite the change in the basis of bank supervision in recent years, its

* Revision of a paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 28, 1937.

nature and the problems with which it has to deal have not changed fundamentally.

In the following analysis I shall assume that we are talking about a fractional reserve banking system operated for profit. I shall assume that the general business structure in which the banking system operates is in the main one of free enterprise and private profit. These assumptions may or may not conform to the existing situation Furthermore, I mean to make no commitment as to whether these assumptions should exist in reality. It simply appears to me that they are useful assumptions for present analytical purposes.

BANK SUPERVISION AND PRIVATE ENTERPRISE

Bank supervision, as we have known it, and as I conceive of the the term remaining significant, operates upon the assumption that banking is a private-profit enterprise. If banking is to remain a private-profit enterprise, the business men engaged in it must be free, within definitely prescribed limits, to exercise discretion in conducting their business and must be free to profit or suffer loss from their decisions.

While it is true that banking is possessed of a peculiar public interest, it is not in any useful sense a public utility; the laws, rules, and logic applicable to other businesses which we term public utilities are not, for the most part, applicable to banking. Neither is it evident that the peculiar public interest which inheres in banking justifies arbitrary interference in the operation of banks. It is not uncommon to note that banking has a peculiar public interest and to assume that making this statement justifies any particular arbitrary interference in the business which may be suggested. I submit that it is necessary to decide definitely what sorts of interference are demanded by this peculiar public interest which inheres in banking and to reject all proposals for interference which do not conform to the principles decided upon.

The fundamental function of bank supervision is to limit the risk of bank failure, i.e., the risk that the value of the assets of a bank may fall below the amount of its liabilities. As I see it, there are two chief avenues by which this control of risk of failure may be maintained. The first is by exercising an influence over the respective portions of a bank's funds which represent equity and which represent debt. The second is control of the quality of assets held by banks.

CONTROL OF BANK CAPITAL

Let us consider first, possible rules concerning the capital of banks. It has long been customary for bank law and bank supervisors to provide for minimum absolute capital requirements. But no very

definite or satisfactory proof has ever been forthcoming that this was a useful approach to the problem. Rather, the necessity is for rules drafted in the form of relations of equity to total banking funds. The simplest and most satisfactory statement of such rules sets up minimum relations of capital funds to total funds in a bank, or, otherwise stated, to total assets. Such a ratio shows the proportion of total funds which are supplied by owners as compared with creditors, and shows the proportion by which assets could depreciate before resulting in bank failure.

In connection with certain problems, capital has sometimes been related to specific asset categories. For example, in deciding what volume of bonds banks might reasonably hold, capital has sometimes been related to total bond account.[1] Some such analyses have assumed that adequate reserves are set up in connection with other assets and that, consequently, all capital accounts are available as a cushion against depreciation in the bond account. On the other hand, some analyses have related total capital account to total loans, assuming that adequate reserves have been set up to provide for possible depreciation in other assets.[2] However, neither of these inconsistent approaches seems reasonable or useful. Total equity is available as a cushion protecting creditors against depreciation in total assets, not against depreciation in assets of some particular category.

During the past 60 or 70 years, the proportion of banking funds supplied by the owners has shown an enormous decline. In 1875, about 35 per cent, and in 1890, 30 per cent of the funds of the commercial banks of the United States were supplied by owners.[3] By 1920, owners were supplying only 12 per cent. Since 1920, the ratio for the banks as a whole has not changed materially.

Approximately one-third of the bank deposits of the country are now in banks having capital of less than 10 per cent of assets.[4] Over two-thirds of the very large banks of the country have capital ratios below 10 per cent. No other business has attempted to operate with so small a portion of its funds supplied by owners. Even in the case of the railroads and the public utilities, nominal equity has always amounted to at least 40 per cent of assets.

The practice of commercial banks, of operating almost entirely with the funds of creditors and to only a very small extent with the funds of owners, has not been confined to the United States. In England, capital

[1] *Investment Bulletin*, Indiana University, November 1937; *Wall Street Journal*, July 13 and July 28, 1937; *Financial and Investment Review*, University of Minnesota, October 1937.

[2] "If Bonds Decline" by E. Sherman Adams, *Banking*, November 1937, pp. 22–23.

[3] Computed from *Annual Reports of the Comptroller of the Currency*.

[4] Estimated from *Federal Reserve Bulletin*, August 1937, p. 798.

funds of commercial banks are 6 per cent of total funds; in Germany, 8.8 per cent; in Scotland, 9 per cent; in Ireland, 9 per cent; and in France, 10 per cent.[5]

DOUBLE LIABILITY

Previous to July 1, 1937, bank creditors were protected against asset depreciation to an extent considerably greater than that indicated by the capital ratio figures by double liability. Since the middle of 1937, however, this factor had ceased to be operative with respect to the bulk of the banks. Many aspersions have been cast upon the usefulness of double liability as a factor affording safety to bank creditors. However, a study of experience indicates that on the whole, some 45 or 50 per cent of double liability assessments have been made good.[6] This would seem to indicate that from the standpoint of protection to depositors the capital of the banks has, in effect, been considerably greater than that which nominally appeared. Furthermore, collections might have been somewhat more complete if certain administrative reforms had been inaugurated.

The chief argument in support of abandonment of double liability was evidently the belief that bank stock would be more popular and the capital ratios of the banks would be increased. But no evidence has been forthcoming that capital ratios will be raised even though double liability is removed. Since capital ratios in other countries have declined to even lower levels than those of this country, there is reason to believe that the decline in the capital ratio is due to factors other than the existence of double liability. Possibly double liability did not contribute substantially to the proper operation of the banking system; but certainly it was not entirely without net benefit. There is no indication that anything is being substituted to take its place. In a sense it may be said that the capital of the banks of the country was suddenly reduced by a large amount on July 1, 1937.

Official attention to the problem of a substitute for double liability has taken two chief forms. First, some pressure has been exerted to set a minimum capital ratio. Second, requirements have been instituted that surpluses shall be built up to a certain relation to par capital. But the surplus requirements seem to be without major significance. Their inadequacy is illustrated by the practice of increasing surplus by the simple device of reducing par capital. Any requirements of the supervisory authorities with respect to the relation of particular capital accounts to each other are of quite minor significance.

[5] League of Nations *Money and Banking 1936–37*, Vol. II.
[6] *Annual Report of the Comptroller of the Currency for 1936*, p. 35.

CAPITAL SUPERFLUITY

Bankers, students of banking, and bank supervisors have often given evidence of a vague feeling that banks must not have "too much capital." It has been alleged that if capital were too great in relation to total banking funds, operations would not be profitable. But there is no evidence to support this position and no principles have ever been devised showing how much capital is "too much." Apparently this concept is for the most part peculiar to the banking business. It is not commonly thought that other businesses will prove unprofitable if equity is too large in relation to total invested funds. It is true that many business men consider desirable the leverage which results from borrowing a large proportion of their funds. But it is generally recognized that such leverage introduces a highly speculative factor. It is peculiar that it should be thought that the greatest leverage is necessary in that business which presumably should be the most conservative of all businesses.

PROFIT RATES ON BANK CAPITAL ACCORDING TO RATIO OF CAPITAL TO ASSETS

Ratio of total capital account to total assets, per cent	Average net earnings per $100 of total capital account*	Correction for losses†	Theoretical profit per $100 of total capital account
.1 to 10	$13.35	$12.50	$0.85
10 to 20	9.15	8.33	.82
20 to 30	5.88	4.00	1.88
30 to 40	4.53	2.86	1.67
40 to 50	3.88	2.22	1.66
50 to 60	4.25	1.82	2.43

* Arithmetic mean of ratios for 1936 computed for 7,459 insured commercial banks not members of the Federal Reserve System.

† This correction by an amount equal to 1 per cent of total assets is based on a study of reported losses of national banks (fiscal years 1918–36). The figure is a very tentative one and the results of correction upon a basis of it are not exact. They simply give some idea of the sort of correction which needs to be made. Whether or not the assumption of independence of rate of loss on assets and capital ratio is proper, we do not know.

From an analytical standpoint it is difficult to see how the banking system, within any significant limits, could have too much capital. If additional capital were introduced into any given bank, an addition to gross earnings could be made by an amount equal to the earnings upon that specific increment. Thus, the additional capital could earn whatever it could have earned if invested directly in assets of comparable safety by its owners rather than through the medium of the bank. Thus, the owners of the bank as a whole will earn upon their funds about the same amount as if they had continued to have only a portion

of their funds invested in the capital of the bank and another portion invested directly outside the bank.

It is true that certain statistical analyses indicate that in practice there is some inverse correlation between the capital ratio of banks and the rate of earnings upon the capital of banks. However, this inverse correlation may be explained by two primary factors neither of which militates against high capital ratios either from the standpoint of bank supervisors or from the standpoint of investors in bank stock. In the first place it is to be expected that the rate of earnings on capital will be less in banks with the higher capital ratios because of the lower risk. When the earnings data of insured banks not members of the Federal Reserve System are adjusted for an assumed average loss of one per cent per annum on total assets, the resulting rate of profits on capital shows no negative correlation with capital ratio.

In the second place, a great many of the banks having high capital ratios presumably had planned to attract much greater amounts of deposits than they possess. Their low earnings are due not to the large capital, as such, but to the large overhead incurred in anticipation of greater volumes of business than actually resulted.

CONTROL OF QUALITY OF ASSETS

We turn now to the second great category of rules in bank supervision, namely, those which exercise an influence over the quality of assets held by banks. A few rules may apply to the assets in general. For example, the rule which provides that the total extensions of credit to any one borrowing interest shall be limited to a certain percentage of capital funds or to a certain percentage of total assets, has proved a very useful one.

The quality of the loans of banks receives a great portion of the attention of bank supervisors. Some of the rules in this connection have to do with the security behind loans. For example, it is commonly required that a mortgage loan shall not be greater than a certain maximum percentage of the appraised value of the security. Rules with respect to security loans are now designed primarily with a view to general credit control and cannot be termed rules of bank supervision. Supervisors have long engaged in general quality classification of loans. Unfortunately the logic behind such classification has been obscured by the use of the term "slow" in connection with one of the major classes.

Clarification of loan classification would be promoted if the concept of degree of risk were in the mind of the person who is doing the classifying and if the substandard loans were thought of as those involving

an undue degree of risk. Classification of loans depends, and apparently must continue to depend, upon the judgment of the examiners. They will consist both of loans which were unduly risky when made by the bank and those which have acquired unduly risky characteristics since acquisition. As a general principle, it is necessary that the banks shall dispose of loans so classified. The success of such classification depends upon a gradual growth of understanding between the supervisors and the bankers concerning proper quality standards.

Supervision of the securities held by banks has made use of somewhat more definite rules than have been possible in the case of loans. Ownership of equities has, for the most part, been prohibited. In the case of bonds, the end in view is to confine bank holdings to those having but a small risk of default. The use of the ratings of the private rating agencies in this connection is an attempt to apply uniform minimum quality standards.

PRICE FIXING IN THE BANKING FIELD

Price determination in the banking field by government officials is becoming increasingly important. Many statistical analyses of banking data are conceived of as being useful in the price fixing process. But as yet no adequate statement has appeared justifying the extension of government price fixing to the banking field. Neither has anyone worked out the principles which should guide price fixing in this field nor the necessary accompanying principles of administration. Until such statements of principles appear, the burden of proof surely rests upon those who support the extension of price fixing to this field and who believe that the practice is administratively feasible. For four years the Federal government has been fixing maxima in connection with certain banking costs. It is becoming increasingly important that the principles for determining those maxima be stated.

In conclusion, it appears to me that if banking is to remain a private-profit enterprise, bank supervision should be largely confined to requiring that a reasonable proportion of banking funds be supplied by owners and that bank assets conform to minimum quality standards.

NEW INDEXES OF PRODUCTION AND TRADE

By Norris O. Johnson
Federal Reserve Bank of New York

Work has recently been completed upon a broad new measure of fluctuations in the physical volume of business, supplanting the indexes of the Volume of Trade formerly computed.[1] The new index, calculated monthly from 1919 to date and expressed in relationship to estimated long term trend, is designed as a measure of production (including construction), together with trade in newly-produced goods and services.

The general lines of composition and weight distribution of the index, called the index of Production and Trade, are indicated in Table I. As a general rule, the series entering into the index are adjusted individually for seasonal variation and estimated long term trend, although in some instances two or more related series are combined before adjustment. Dollar series are adjusted for price changes, or "deflated," where necessary, but the use of series requiring such adjustment has been minimized.[2] Moving averages have been employed in some instances to meet special problems. For example, a six months' moving average placed at the sixth month is applied to construction contracts, inasmuch as actual construction work during any given month is dependent on contracts let during preceding months as well as upon contracts let during the month itself.

There are four main group indexes, Production, Primary Distribution, Distribution to Consumer, and Miscellaneous Services. In addition, production series are broken down into four parts—producers' durable, producers' nondurable, consumers' durable, and consumers' nondurable goods. This split permits the calculation of indexes of Consumers' Goods and Producers' Goods, and Durable Goods and Nondurable Goods. The number of series embraced in the total index was appreciably smaller at the beginning than now—the number increasing from about 60 in 1919 to 82 at the present time. This less adequate coverage in the earlier years should be kept in mind particularly in interpreting the subordinate indexes.

[1] See Carl Snyder and Leroy M. Piser, "The Index of the Volume of Trade: Third Revision," this Journal, volume 26 (1931), pp. 436–442.

The differences between the indexes formerly computed and those described in this article appear most conspicuously in the weighting structure. In addition, there are numerous changes in composition, in subordinate indexes derived, in measurements of trend and seasonal variation, and in price adjustments. No effort is made in the new indexes to include "financial activity," and the total index, called the index of Production and Trade, in this respect corresponds most closely to the former Volume of Trade III index.

[2] Weights of deflated series total 25.9 (out of 100) in the total index. The most important deflated series are construction contracts and department store sales.

TABLE I
CURRENT COMPONENT INDEXES, WEIGHTS, AND NUMBER OF SERIES

	Weights		*Number of Series*	
A. Production				
1. Producers' Goods*	23.2		30	
2. Consumers' Goods*	23.2		30	
3. Employee-hours, manufacturing	8.6		1	
		55.0		61
B. Primary Distribution				
1. Car loadings, merchandise & miscellaneous	9.0		1	
2. Car loadings, other	2.5		1	
3. Waterway traffic	0.2		4	
4. Exports	2.2		1	
5. Imports	2.0		1	
6. Wholesale grocery sales	0.2		1	
		16.1		9
C Distribution to Consumer				
1. Department store sales	8.9		1	
2. Chain grocery sales	5.1		1	
3. Chain sales other than grocery	3.5		1	
4. Mail order house sales	2.9		1	
5. Gasoline consumption	3.2		1	
6. New passenger car registrations	2.4		1	
		26.0		6
D. Miscellaneous Services				
1. Advertising lineage	1.0		2	
2. Postal receipts	0.5		1	
3. Communication	0.6		1	
4. Commutation railway passenger-miles	0.2		1	
5. Other railway passenger-miles	0.6		1	
		2.9		6
		100.0		82

* The 60 series entering into Producers' Goods and Consumers' Goods are also classified into Durable Goods and Nondurable Goods.

Table II gives the total index monthly from 1919 to date. Because of space limitations the various subordinate indexes are not presented here, but releases covering them are available upon application.

THE WEIGHTING BASIS

In deriving weights use has been made of the considerable new data which have become available for this purpose, and a system of secularly changing weights has been set up. The results of eight or nine biennial Censuses of Manufactures are now available beginning in 1919; censuses of distribution, both wholesale and retail, and of other non-

TABLE II

NEW INDEX OF PRODUCTION AND TRADE

100 = estimated long term trend

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1919	108	103	100	102	102	106	110	108	111	107	109	110	106
1920	111	108	108	103	104	105	104	102	98	95	95	91	102
1921	87	85	85	85	87	88	87	89	88	90	89	89	87
1922	91	92	96	95	99	101	101	100	101	103	106	107	99
1923	108	107	109	111	111	109	108	106	104	105	104	104	107
1924	105	106	103	103	100	97	96	98	101	102	104	105	102
1925	107	106	106	106	105	105	106	106	106	109	110	113	107
1926	111	109	109	109	108	108	109	110	110	110	110	110	110
1927	109	109	110	109	109	108	107	108	106	105	105	103	107
1928	106	107	107	105	107	106	108	109	111	112	113	113	109
1929	113	114	113	112	113	114	115	115	114	112	107	104	112
1930	103	103	100	100	99	96	94	93	92	90	88	86	95
1931	86	87	87	89	87	85	85	82	80	78	77	76	83
1932	74	73	70	68	66	65	63	64	67	68	67	65	67
1933	65	64	60	65	71	77	79	77	74	72	70	71	70
1934	72	74	76	75	76	74	71	72	70	71	72	74	73
1935	76	76	76	74	74	75	75	77	78	81	82	84	77
1936	83	82	82	84	86	87	89	90	89	91	93	96	88
1937	93	94	95	94	94	92	93	93	91	88	83	80	91
1938	77	75	75	—	—	—	—	—	—	—	—	—	—

manufacturing lines of business have been instituted;[3] and improved and more comprehensive estimates of the total volume of construction have recently been made.

In assigning weights the underlying basis has been total values in trade, but the factor of judgment enters heavily into the decision as to what values to apply to particular series. If values used were actual values of series included, supposing those values to be available, it would be assumed that all other activities were "covered" by general imputation; that is, it would be assumed that the total index thus weighted would reflect as well as anything activities not directly measured. The *general* imputation at best rests on the logical ground that a particular unmeasured activity, or a combination of many unmeasured activities, may follow in a general way the composite of measured activities, and at worst it is a confession that certain activities are not and cannot be included. In many cases, however, there is a strong presumption that certain unmeasured activities are more closely related to particular measured activities than to the total index as it otherwise would be derived, and a direct imputation is made. In other words, the values applied to the individual series are built up, where the quality of the latter seems to justify it, to take account of related activities which are not represented.

[3] For an account of some of the new work of the Bureau of the Census, see F. A. Gosnell, "Highlights of the 1935 Census of Business," this JOURNAL, volume 32 (1937), pp. 263–270.

CHANGING WEIGHTS

Changing weights are used to give effect to the changing importance, in a gradual secular sense, of individual branches of production and trade.[4] If weights were permitted to change *cyclically* they would exaggerate positive deviations from trend and minimize negative ones. The correction would be of less consequence if all series had the same and simultaneous cyclical deviations, but needless to say this is not even approximately true.

CHART I

INDEX OF PRODUCTION AND TRADE IN THE UNITED STATES SINCE 1919

(Seasonally adjusted)

Flexibility of the weight structure, of course, becomes vital with a fairly extended time span. To take two conspicuous examples, anthracite coal is now very much *less* important in our economic life than at the beginning of our nineteen year period, and electrical energy has become very much *more* important. The dollar volume of anthracite coal production exceeded $500,000,000 in 1923; thirteen years later it had fallen to $226,000,000. The value of electric power generated, under $1,000,000,000 in 1922, had exceeded $2,000,000,000 by 1936. While figures for these particular years may reflect special factors,

[4] In addition, readjustments in weights have been made to make room for new series. The entrances of new series do not, generally speaking, create artificial movements of the indexes at the points of entrance, but they naturally modify the characteristics of the indexes to some extent.

which must be discounted in the determination of actual weights, the underlying trends are unmistakable.

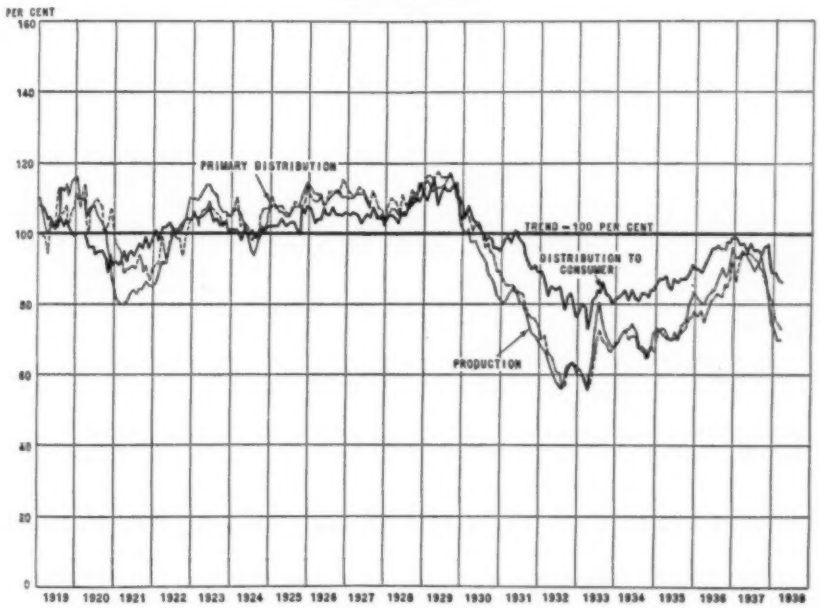
TRENDS

The fitting of a trend is always a matter requiring discrimination, and at the present time, after the lapse of so many years since our business volumes have given an indication of their capacity, or near capacity performance, the problem is especially difficult. In the present

CHART II

PRINCIPAL GROUP INDEXES INCLUDED IN INDEX OF PRODUCTION AND TRADE

(Seasonally adjusted)



study, care has been taken to consider not only the record of each series itself, but also supplementary information concerning the industry and the performance of related data. The general concept of trend position which has been employed will be apparent from a study of the indexes themselves, expressed as they are in terms of estimated trend.

In trend fitting numerous applications have been made of the curve, $y = bc^{1/(d+x)}$, originally presented in this JOURNAL in December, 1935.[5] This curve increases at a constantly decreasing percentage rate, and can be applied with unusual facility. It met a problem which had arisen in connection with the parabolic functions formerly employed to a

[5] Volume 30 (1935), p. 717. For short-cut calculation see also volume 31 (1936), p. 731.

considerable extent. Parabolas, though acceptable for trends over parts of their ranges, approach turning points if used long enough, and, aside from the danger in predicting or anticipating when and if turning points are going to occur, the behavior of a parabola after the turning point has been passed is usually irrational in these applications.

INTERPRETATION

While the subordinate indexes are set up on the basis of the successive stages, Production of Producers' Goods, Production of Consumers' Goods, Primary Distribution, and Distribution to Consumer, they do not portray the flow of identical goods through successive steps from raw materials to finished goods in the hands of the consumer. In theory we might like to have measures of (1) production of raw and semi-finished goods, (2) production of finished consumers' goods, (3) wholesale distribution of consumers' goods, and (4) retail distribution. Unfortunately, our economic structure itself, no less than available statistics, would limit the significance of such results. Many goods are produced which become capital equipment of producers, and the inclusion of these as producers' goods introduces a factor of durable capital formation and eliminates the possibility of appraising changes in inventory position by comparing Producers' Goods Production and Consumers' Goods Production. Moreover, consumers' goods often pass directly from manufacturer to retailer, without the intervention of wholesale intermediaries; they may even, as in the case of residential construction, pass directly from producer to consumer without the intervention of any middleman. And aside from these institutional complications, there is seldom a basis, in available statistical data, for lining up even certain classes of goods and following them through successive stages of production and distribution. These circumstances do not make it useless to seek measures of the flow of goods and services at certain important points, but they require us to keep in mind that all goods do not pass through all four stages, and that, even for goods that do, there are few cases where statistics are at hand to observe the flow from month to month at all four stages.

The physical volume of trade in consumers' goods by wholesale intermediaries cannot be accurately measured on the basis of available data, and even if it could the results would not be comparable with broad indexes either of consumers' goods production or of retail distribution because so many goods by-pass wholesale middlemen. In this study, wholesale distribution has been measured in the broad sense including sales of producers to other producers and traders, thus including primary distribution not only of producers' goods, but also of

some consumers' goods which do not pass through a separate classification of middleman. This measurement is obtained largely from railway freight traffic. To emphasize the breadth of interpretation of wholesale distribution, the resultant index is called Primary Distribution.

The most promising comparison between the various subordinate indexes from the standpoint of evaluating an inventory position, might appear to be between Production of Consumers' Goods and Distribution to Consumer. But even here the composition of the two indexes is not similar enough to permit accurate deductions as to inventory changes. Production of Consumers' Goods includes residential construction, household electricity sales, anthracite coal production, and newsprint paper consumption, none of which is represented in Distribution to Consumer. Other production series, tobacco manufacturing and meat-packing, for example, are inadequately represented in Distribution to Consumer. On the other hand, Distribution to Consumer reflects the distribution of women's apparel and a wide variety of products whose production is not measured. Passenger cars, and gasoline are two items which are quite fully covered in both indexes, but even in such cases discrepancies would not accurately reflect inventory changes without making an adjustment for exports (or imports).

There are two possible viewpoints which might have been taken in working out the subordinate indexes: (1) the items might have been made as nearly identical as possible; or (2) each index might have been made as broad as available data permit. Adoption of the first viewpoint would have meant seriously restricting the coverage not only of the subordinate indexes themselves but also of the index of Production and Trade as a whole. Adoption of the second viewpoint, the course actually followed, means losing the advantage of close comparability between subordinate indexes, but it is not believed, for reasons cited above, that the alternative procedure would have yielded results of broad significance.

The major objective in this study has been the total index, of Production and Trade, and the subordinate indexes, which might have been narrowed to improve comparability for special purposes, have been placed upon broad foundations, not only to make them individually as representative as possible, but also to make them contribute as much as possible to the total index.

ACCURACY AND INCLUSIVENESS OF INDEXES

Considerable gaps still exist in the available data, such as in the

service industries which have become so important a feature of our economic life, and in lines like the machinery industry, where the product, while "physical," is not of uniform size or quality and therefore does not accommodate itself to numerical count.[6] We also make use of many physical counts which are to some degree biased by non-uniformity in the units counted, as in measuring automobile production in numbers of cars, and it is not safe to underrate either the areas of economic activity that are not measured at all or the errors that are involved in the measurements actually used. Nevertheless, the raw material supply of statisticians has enjoyed a noteworthy expansion in the past twenty years; and each widening of the statistical basis renders our tentative generalizations more and more free from the idiosyncrasies which we know to affect individual series.[7]

[6] The series of employee-hours worked in manufacturing industries serves a double purpose, as a supplemental measure of factory production, and as a measure of employment (including the degree of employment of employed workers) in this field. In so far as labor input is correlated with production, this treatment affords some coverage for industries where production is not measured directly.

[7] These indexes are the work of the Research Section of the Federal Reserve Bank of New York, and especially of Alice L. Carlson, Eloise W. Lane, Mary Crandall, Inglis Winsor, Jane L. Wagner, and Lucile Bagwell.

A QUARTERLY SERIES OF MANUFACTURERS' INVENTORIES

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The quarterly series on dollar inventories in manufacturers' hands, shown in Table II below, was constructed in November of last year and was subsequently continued through December 31, 1937, the latest date available at this writing. The purpose was to ascertain if there might be a connection between the trend of manufacturers' inventories and the extreme rapidity of the decline in general manufacturing activity during the last quarter of 1937. While various series on inventories were already available, it was felt that a series confined to inventories reported on the balance sheets of manufacturing companies might give additional light on the particular problem indicated.

Unfortunately, very few industrial corporations publish quarterly balance sheets regularly, and it was therefore impossible to construct any sort of comprehensive series. In fact, the 50 concerns used include practically all the manufacturing corporations for which quarterly inventories were available in 1936 and 1937. (Because of incomplete data, the series was not extended further back than 1936 except for year-end figures.) While this is a small sample indeed, the group is sufficiently representative to indicate at least the general trend of dollar inventories in manufacturers' hands. Evidence of this is found in Table I below, which compares year-end figures of the 50 companies back to 1929 with those of another group of 487 large and thoroughly representative manufacturing corporations. It will be noted that the fluctuations in the two groups are similar.

TABLE I

INVENTORIES OF MANUFACTURING CORPORATIONS

Comparison of Two Series
(In thousands of dollars)

End of year	*487 companies*	*50 companies*
1929	$4,234,935	$226,035
1930	3,856,091	186,641
1931	3,221,250	148,397
1932	2,656,048	119,891
1933	3,011,975	150,809
1934	3,298,343	166,436
1935	3,558,600	194,023
1936	4,097,442	238,928
1937	4,780,865	266,992

The complete figures for the 50 manufacturing companies are given in Table II. Inventories for General Motors are shown separately, as they would be given too much weight if included in the group.

TABLE II
INVENTORIES OF 50 MANUFACTURING COMPANIES BY QUARTERS, AND FOR PAST YEARS
(in thousands of dollars)

	10 companies with assets of over $35,000,000	15 companies with assets between $10,000,000 and $35,000,000	25 companies with assets between $1,000,000 and $10,000,000	Total 50 companies	General Motors
TOTAL ASSETS September 30, 1937	$893,100	$288,700	$148,500	$1,330,300	$1,617,000
INVENTORIES					
1928—December 31	128,518	49,042	28,995	206,555	196,693
1929—December 31	143,584	49,111	33,340	226,035	188,473
1930—December 31	116,027	43,436	27,178	186,641	136,299
1931—December 31	93,920	33,081	21,396	148,397	106,471
1932—December 31	77,574	25,112	17,205	119,891	75,479
1933—December 31	98,713	31,744	20,352	150,809	115,585
1934—December 31	113,034	31,017	22,385	166,436	138,598
1935—December 31	134,809	33,329	25,885	194,023	196,325
1936—March 31	128,497	33,333	27,697	189,527	193,755
1936—June 30	118,823	34,124	29,803	182,750	166,432
1936—September 30	130,061	35,360	31,717	197,138	165,848
1936—December 31	166,893	39,924	32,111	238,928	225,645
1937—March 31	172,047	45,097	36,261	253,405	253,591
1937—June 30	167,512	48,930	39,995	256,437	245,071
1937—September 30	192,723	50,580	42,303	285,606	263,845
1937—December 31	180,778	48,050	38,164	266,992	279,146
PERCENTAGE GAIN					
Dec. 31, 1936 over Dec. 31, 1935	23.8	19.8	24.1	23.1	14.9
March 31, 1937 over March 31, 1936	34.6	35.3	30.9	33.7	30.9
June 30, 1937 over June 30, 1936	41.0	43.4	34.2	40.3	47.3
Sept. 30, 1937 over Sept. 30, 1936	48.1	43.0	33.4	44.9	59.1
Dec. 31, 1937 over Dec. 31, 1936	8.3	20.4	18.8	11.8	23.7

In analyzing Table II, the first point to consider is that the figures are in dollars, and that consequently the price factor must always be kept in mind. The writer has tried various methods of correcting the series for price fluctuations, but none seemed entirely satisfactory because of the numerous difficulties involved. For instance, raw materials, which constitute an important part of total inventories, are not usually purchased all at once, but over a period of time; thus, having chosen a particular price index for the purpose of correcting the inventory figure for any given date, what month or months of the price index shall be used? Again, there are various methods of valuing inventories. Most companies report them at "lower of cost or market," which means that a declining price trend is reflected more quickly in the dollar value than a rising price trend. But some concerns use other methods, such as "base stock" and "inventory reserve," which affect both the value of inventories and the amount of operating profit or loss arising from inventory price fluctuations.

Any exact correction of dollar inventory figures for price changes is

therefore impossible. As an approximation, perhaps the use of the wholesale price index of non-agricultural commodities (Bureau of Labor Statistics) is as satisfactory as any; but the results should be applied with caution, except in general terms. With the price qualification in mind, the trend of inventories appearing on Table II will be examined.

The most striking feature of the table is the rapid rise in dollar inventories in the first nine months of 1937. There had been a steady increase from 1932 through 1935, as would be expected in a period of business recovery and rising prices. There was a very substantial advance in the latter part of 1936; but that year witnessed a 17 per cent gain over 1935 in industrial production as well as a more moderate price rise, so that the increase in inventories was still hardly excessive.

In 1937, however, the inventory series up to September 30 registered a gain considerably more rapid than that of industrial production or prices. The September 30 figure reached a peak of $285,606,000—the highest for any date used in the series; 26 per cent higher than at the end of 1929; and 45 per cent higher than on September 30, 1936.

Part of the above rise was obviously due to higher material prices and labor costs. The non-agricultural price index of the Bureau of Labor Statistics, for example, rose from 80.9 for September, 1936, to 87.6 for September, 1937. It is certainly most unlikely, however, that all of the sharp advance in inventory figures can be explained on these grounds. The 45 per cent gain in one twelve-month period must have involved a considerable increase in physical inventories as well as in their value per unit. The case of General Motors offers some evidence on this point; that company has estimated that of the $53,500,000 increase in its inventories between the end of 1936 and the end of 1937, about $32,000,000 was caused by the increased cost of materials and labor.

It can thus be reasonably assumed that the physical volume of inventories in manufacturers' hands did increase sizeably in 1937. It is not proposed to discuss why this took place; but for whatever reasons, inventories were at a high peak at the end of the third quarter, at the very time when the usual fall recovery was not materializing and when the curve of business activity was commencing its rapid decline. In such a situation, many concerns found their inventory position top-heavy. The natural course was to restrict their purchases until their own stocks could be reduced to more manageable levels; and this process would work back to primary producers, whose new orders would then quickly dwindle. This sort of a sequence would logically help to explain the almost complete collapse in steel activity, which

experienced a drop even more precipitate than that of industrial production as a whole.

As to the period since September, 1937, there appears to have been a gradual improvement in the inventory situation. The drop of nearly $19,000,000 between September 30 and December 31, as shown on Table II, included losses taken by year-end write-downs; but there was doubtless some physical reduction as well. Further reductions will probably show up for the first quarter of 1937 when the March 31st figures become available.[1]

In conclusion, the rise in manufacturers' inventories was only one of many developments affecting the trend of business during 1937; but it seems reasonably clear that the rapidity of this rise in the first nine months of 1937 was a factor in the rapidity of the business decline in the fourth quarter.

[1] Later information, covering the first 29 companies of the group to report March 31st figures, shows that inventories of these 29 companies were $144,675,000 on March 31, 1938, as compared with $153,490,000 on December 31, 1937, and $139,972,000 on March 31, 1937.

PROBLEMS IN THE COMPILATION OF DATA ON TOTAL RELIEF AND WORK PROGRAM EXPENDITURES*

By Dorothy Fahs Beck

Central Statistical Board and *Special Committee to Investigate Unemployment and Relief, United States Senate*

The Special Committee of the Senate to Investigate Unemployment and Relief was appointed and began its studies in the summer of 1937.[1] Within the limits of its resources, the Committee and its staff have undertaken to assemble some of the more essential data on such subjects as the extent and trends of unemployment, the costs of relief and emergency public employment programs, the number of persons or families receiving assistance of various types, the ability of States and localities to finance relief, the functioning of unemployment insurance systems, the causes of both urban unemployment and rural poverty, and the most effective means of dealing with these varied problems.

For help in the compilation of pertinent information, the Senate Committee has called upon industrial and labor leaders, private and public municipal and State agencies, and a large number of agencies or bureaus of the Federal Government. Because of the problem of statistical coordination involved in an analysis of relief costs, the chairman of the Central Statistical Board was requested to provide assistance in assembling data on total public expenditures for relief and emergency employment programs during the five-year period, 1933 to 1937 inclusive. As a result of this request, the services of the author were loaned to the Committee for this purpose.

The detailed final results of the compilation of data on total expenditures for the relief of destitution and unemployment are to be made available to the general public in the published hearings of the Senate Committee. These hearings will also contain the testimony of Dr. Stuart A. Rice, Chairman of the Central Statistical Board, regarding the major trends which the data indicate and some of their implications.[2] For this reason this account will be confined largely to a discus-

* This paper is adapted from a paper on "Consolidated Statistics of Relief Expenditures Since 1933" presented by the author on December 29, 1937, at the annual convention of the American Statistical Association held at Atlantic City, N. J.

[1] This Committee was appointed pursuant to Senate Resolution 36, agreed to on June 10, 1937. The following Senators were appointed to membership: James F. Byrnes (S. C.), Chairman; Bennett Champ Clark (Mo.), Carl A. Hatch (N. M.), James E. Murray (Mont.) (Democrats); James J. Davis (Pa.), Lynn J. Frazier (N. D.), and Henry Cabot Lodge, Jr. (Mass.) (Republicans).

[2] Dr. Stuart A. Rice testified on this subject at an open hearing of the Special Committee of the Senate to Investigate Unemployment and Relief on March 15, 1938. Dr. Rice's testimony, together

sion of the problems of methodology and statistical coordination and comparability which arose in the course of the project.

In order to indicate very briefly the general nature of the inquiry and some of the major findings, two summary tables are reproduced here. The first table presents the final totals by source of funds. The second table indicates by half-year periods the costs of the various programs included in the totals.

As will be noted, all the data pertain to total costs. The interest of the Committee in relief financing led at the outset to the decision that the series should include all types of costs, including those incurred for pay rolls of all types, administration, materials, rent, land, and other items essential to the programs included in the series. In order to determine the extent to which published sources could be used to meet this and other needs of the Committee, a preliminary search of available data was made. This examination revealed that most of the consolidated series relative to expenditures for relief and emergency-employment programs were of one of two types: either they included only the amounts actually extended to persons considered in need of relief, or they included in addition to these amounts only the earnings of nonrelief employees on work programs with a relief emphasis. Seven statistical series presenting integrated data on relief expenditures on all levels of government for sample areas or for the United States as a whole were found to have been compiled by either the Works Progress Administration or the Social Security Board in cooperation with other agencies.[3] Of these seven series, four were still being currently released

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with copies of the large charts presented by him, will be published in Volume 2 of the *Hearings before a Special Committee to Investigate Unemployment and Relief, United States Senate*. Appendix 1 of this volume will contain the complete tables and full explanatory notes and technical specifications. This volume will probably be available by the time this issue of the JOURNAL is off the press. Until the supply is exhausted, these hearings can be secured without charge by addressing a request to the Special Committee to Investigate Unemployment and Relief, United States Senate, Senate Office Building, Washington, D. C.

[3] The seven compilations of data on relief expenditures referred to are to be found in the following sources: (1) monthly memoranda on relief prepared since June 1937 by the Works Progress Administration for administrative use and for limited distribution, (2) summaries of relief, public assistance, and Works Program data published monthly by the Social Security Board in the *Social Security Bulletin*, (3) the urban relief series now included in the *Social Security Bulletin*, but which was formerly published by the Children's Bureau, (4) the series on relief in rural and town areas now published by the Social Security Board in this same bulletin, but which was initiated and carried on for a considerable period by the Works Progress Administration, (5) *Trends in Relief Expenditures: 1910–1935* by Miss Anne E. Geddes, a research monograph published by the Works Progress Administration, (6) special analyses of differences between urban and rural trends now in preparation by the Works Progress Administration, and (7) an annual series on total relief costs through 1936 first presented at the House *Hearings on the Emergency Relief Appropriation Act of 1937* and later republished in the June 1937 issue of the *Report on Progress of the Works Program*. (After the initiation of the Senate Committee project, a revised form of this series restricted to "security programs" was republished in half-year time units in the December 1937 issue of the *Report on Progress of the Works Program* and in the January 1938 House *Hearings on the Supplemental Appropriation for Relief and Work Relief*, fiscal year 1938.) Other composite data with a smaller coverage or less regular periodicity have also appeared from time to time.

TABLE I

TOTAL COSTS OF RELIEF, PUBLIC ASSISTANCE, FEDERAL WORK PROGRAMS, AND EMERGENCY PUBLIC WORKS*

By Source of Funds

(in thousands of dollars)

Time period	Total—all public sources of funds	Federal funds	State and local funds		
			Total	Funds borrowed from the Federal Government	Funds secured from other sources
Total 1933–1937	$19,303,409	$14,218,773	$5,084,636	$705,908	$4,378,728
1933					
January–June	610,158	389,983	220,175	13,358	206,817
July–December	993,729	744,051	249,678	29,932	219,746
1934					
January–June	1,930,624	1,555,630	374,994	45,648	329,346
July–December	2,013,350	1,597,080	416,270	83,574	332,696
1935					
January–June	1,976,350	1,529,617	446,733	76,100	370,633
July–December	2,015,847	1,525,245	490,602	106,122	384,480
1936					
January–June	2,627,555	1,932,135	695,420	110,393	585,027
July–December	2,677,170	1,928,584	748,586	105,929	642,657
1937					
January–June	2,463,167	1,747,406	715,761	73,596	642,165
July–December	1,995,459	1,269,042	726,417	61,256	665,161

* The data include expenditures for pay rolls of all types, materials, administration, and all other costs incident to the programs included in the series with certain minor exceptions noted in the original source. For explanatory notes on component programs and all technical specifications applicable to these data, see Volume 2, *Hearings before a Special Committee to Investigate Unemployment and Relief, United States Senate*, Appendix 1.

at the time of the initiation of this project. Six of these series, however, omitted materials and administrative costs. The only series compiled on a total costs basis was prepared and published by the Works Progress Administration.[4] The coverage of this series was narrower with respect to both the programs and geographic areas included than that desired by the Committee, and the classification was based on the identity of the agencies concerned rather than on the types of programs involved. In these and other respects the series did not meet fully the need of the Committee for data having both a wide coverage and an abundance of detail as to individual items. An independent compilation was, therefore, considered desirable.

Since the allocation of the burden of relief costs as between the tax resources of Federal, State, and local governments has long been a central theme of legislative discussions of relief policies, it was further the wish of the Committee that the compilation include not only Federal expenditures but also State and local expenditures for similar activities. The data for most of the items in the tables had to be

[4] This series is listed as series seven in the preceding footnote which indicates sources.

secured, therefore, from the Federal administrative agencies involved rather than from the central fiscal records, since only from this source could data be obtained which would permit the simultaneous presentation of trends on all levels of government. If only the picture of Federal expenditures had been desired, an exact accounting statement of total agency expenditures could have been obtained from the United States Treasury or from the General Accounting Office. Even in this case, however, the functional split of a single agency's expenditures along lines desired by the Committee would in some cases have proved a difficult undertaking for the Treasury or for the General Accounting Office. For this reason the primary data were secured wherever feasible from the agency directly administering the program. Where needed, the Treasury data were utilized as a supplementary source of information on Federal expenditures and as a tool to assist in analyzing the data submitted by the agencies. In each case the agency responsible for a given Federal program undertook to provide information on State and local funds spent in conjunction with Federal funds. Fortunately for this purpose, the Federal Emergency Relief Administration, the Works Progress Administration, and certain other Federal agencies responsible for programs in which State and local participation has been important have emphasized consistently a source-of-funds classification in their statistical reports. In these cases the type of data needed was readily available. In the case of some other programs, however, estimates had to be resorted to in order to secure a time series by source of funds of the type required. In this manner that problem of splicing together information on various levels of government which is paramount to all studies of this type was solved, in so far as the problem is believed capable of solution on the basis of existing statistical reports in this field.

The decision to secure the data in most cases from the individual administrative agencies responsible for programs necessitated personal contacts with twenty-nine Federal agencies or bureaus.[5] Most of the other problems which arose were inherent in the process of collecting from this large number of agencies financial statistics for use in a framework not previously standardized. The great majority of the agencies included in the tabulation maintain an abundance of statistical and financial records regarding their own operations. Because of the divi-

[5] This number represents the total number of Federal agencies or bureaus from whom data were secured by direct contact. The total number of agencies or bureaus included in the tabulation was between three and four times this number. Reports on the remaining agencies were secured either from published Treasury reports or from the Federal Emergency Administration of Public Works. This more indirect approach was used only in the case of agencies or bureaus whose programs involved no financial participation from State and local governments and whose expenditures were to be grouped with those of many other agencies as a miscellaneous item under "emergency public works."

sion of administrative responsibility for relief and work programs, however, relatively little attention has been devoted to establishing interagency comparability in these reporting systems. For this reason the development of consolidated tables of the type desired for the use of the Committee proved much more difficult than was at first anticipated.

One of the first issues to arise related to the limits to be established for the scope of the tabulation. It became urgent to determine, for example, what programs were to be defined as relief programs, or were sufficiently related to relief activities to be considered in conjunction with relief expenditures. A further decision was necessary as to the feasibility or desirability of limiting the tabulation to expenditures of an emergency character associated with depression conditions. Except in the case of public works, the final totals include, in so far as possible, both regular and emergency expenditures in this general field. After some experimentation the title, "total costs of relief, public assistance, Federal work programs, and emergency public works" was selected for the compilation. The multiple title itself indicates to some extent the manner in which the concept of relief shades off on all sides into closely related activities. Some types of farm loans, public works construction activities, educational aid, public health programs, assistance to veterans, recovery loans to industries and financial institutions, and purchases of surplus agricultural commodities may be said to represent activities at least borderline to relief, public welfare, or recovery measures in the broad sense. Agencies responsible for activities bordering on the scope of the tabulation sometimes contended for the omission of their programs on the grounds that they did not constitute "relief" and that placing them in a "relief" context would affect unfavorably the future position of the agency. On the other hand, agencies whose programs were obviously to be included wished in most cases that the scope of the table be made as broad as possible. The compromises finally agreed upon probably err on the side of too extensive rather than too narrow a coverage.[6] At least the scope is broader than that of any previous tabulation of this type, a fact which is reflected in the relatively large final totals. This breadth of scope was purposely provided for, since it was considered essential that relief trends, strictly considered, be interpreted at all times in the light of trends in emer-

[6] Of the various debatable items, probably the most significant from the point of view of magnitude is the inclusion in the totals of expenditures for emergency public works from funds provided under the National Industrial Recovery Act. Under this program the Federal Government made no formal requirement that employment be restricted to persons in need of relief. Since many of the projects initiated with these funds were later continued with Works Program funds under employment policies requiring high percentages of relief labor, the inclusion of these early emergency public works programs seemed essential to a sound perspective on trends.

TABLE II

TOTAL COSTS OF RELIEF, PUBLIC ASSISTANCE, FEDERAL WORK PROGRAMS, AND EMERGENCY PUBLIC WORKS, INCLUDING FEDERAL, STATE AND LOCAL PUBLIC FUNDS*

By Type of Program
(in thousands of dollars)

Type of Program	Total	1933		1934		1935		1936		1937	
		Jan.–June	July–Dec.	Jan.–June	July–Dec.	Jan.–June	July–Dec.	Jan.–June	July–Dec.	Jan.–June	July–Dec.
TOTAL, all programs	$19,303,409†	$610,158	$993,729	$1,930,624	$2,013,350	$1,976,350	$2,015,847	$2,627,555	$2,677,170	$2,463,167	$1,995,459†
TOTAL, excluding emergency public works and surplus commodities	13,486,753†	507,331	791,287	1,467,843	1,186,717	1,417,412	1,369,198	1,827,074	1,711,251	1,773,813	1,434,827†
I. General relief	5,063,286	419,618	373,315	535,222	914,471	1,044,025	714,489	315,443	235,971	274,440	236,292
A. Direct relief											
1. Under the Federal Emergency Relief Administration and State and local administrations	2,810,290	256,804	225,166	304,472	352,066	427,531	406,882	243,433	186,376	211,740	195,820
2. Under the Farm Security Administration (subsistence grants to farmers)	59,275	—	—	—	—	—	2,307	12,465	8,114	27,374	9,015
3. Under the Office of Indian Affairs (direct relief to Indians)	1,692	110	101	124	113	138	120	305	306	214	161
B. Work relief (under the F.E.R.A. and State and local administrations—payments limited to family need)	1,468,159	139,148	117,352	148,430	419,016	452,632	181,219	6,423	3,939	—	—
C. Other general relief costs	723,870	23,556	30,696	82,196	143,276	163,724	123,961	52,817	37,236	35,112	31,296
II. Federal work programs primarily designed to employ relief labor	5,368,751	—	219,743	735,228	11,994	22,393	288,361	1,125,944	1,142,411	1,020,254	802,423
A. Civil Works Administration and Civil Works Service	943,103	—	219,057	724,046	—	—	—	—	—	—	—
B. Works Progress Administration	4,244,332	—	—	—	—	—	273,911	1,094,347	1,115,075	979,043	781,956
C. Federal Emergency Relief Administration											
1. Emergency education	34,480	—	415	6,735	6,316	13,862	6,773	303	58	14	4
2. Student aid	14,931	—	3	3,370	4,420	7,138	—	—	—	—	—
3. Other special F.E.R.A. activities	7,298	—	268	1,077	1,258	1,393	2,275	883	144	—	—
D. National Youth Administration											
1. Student aid	57,660	—	—	—	—	—	5,398	18,289	8,590	19,675	5,708
2. Work projects	66,947†	—	—	—	—	—	4	12,122	18,544	21,522	14,755†
III. Work program of the Civilian Conservation Corps	1,864,150	48,018	160,330	155,213	207,76	246,362	284,587	206,092	174,930	221,618	159,238
IV. Specialized types of assistance to unemployables (both under the Social Security Act and not under this Act)	959,285	39,695	37,899	40,617	45,372	57,871	65,988	89,325	147,358	198,244	236,916
A. Aid to the aged	639,604	14,550	13,710	15,527	19,443	31,525	38,843	57,404	111,358	153,710	183,534
B. Aid to dependent children	266,979	22,012	21,016	21,594	21,786	22,145	22,738	25,699	28,974	36,853	44,162
C. Aid to the blind	52,702	3,133	3,173	3,496	4,143	4,201	4,407	6,222	7,026	7,681	9,220

TABLE II (*Continued*)

Type of Program	Total	1933		1934		1935		1936		1937	
		Jan.–June	July–Dec.	Jan.–June	July–Dec.	Jan.–June	July–Dec.	Jan.–June	July–Dec.	Jan.–June	July–Dec.
V. Rehabilitation loans to destitute and low-income farmers	231,281	—	—	1,563	7,118	46,761	15,773	90,270	10,581	59,257	42‡
A. F.E.R.A. and State rural rehabilitation corporations											
1. Amounts loaned	80,038	—	—	1,563	7,118	49,243	9,103	7,185	4,020	1,427	379
2. Amounts repaid (*deduct*)	15,803	—	—	—	—	2,568	4,597	2,565	2,798	1,633	1,642
3. Net disbursements	64,235	—	—	1,563	7,118	46,675	4,506	4,620	1,222	206‡	1,263‡
B. Farm Security Administration											
1. Amounts loaned	162,011	—	—	—	—	—	7,907	72,106	15,210	55,568	11,220
2. Amounts repaid (*deduct*)	42,647	—	—	—	—	—	1,879	—	17,537	5,425	17,806
3. Net disbursements	119,364	—	—	—	—	—	6,028	72,106	2,327‡	50,143	6,586‡
C. Other costs of rural rehabilitation program (Farm Security Administration)	47,682	—	—	—	—	86	5,239	13,544	11,686	9,320	7,807
VI. Emergency public works	5,390,352	72,358	166,802	411,850	641,743	478,877	634,826	794,583	958,904	678,082	552,327
A. Public Works Administration											
1. Non-Federal projects (grants, collateral loans, and sponsors' contributions)	1,848,865	—	7,369	53,681	143,225	133,652	195,120	341,938	421,144	287,929	264,807
2. Federal low-cost housing projects	112,348	—	—	654	1,266	6,893	14,077	8,576	18,853	31,795	30,234
3. Other P.W.A. costs	83,155	—	1,467	4,625	6,849	8,653	11,327	14,596	15,166	11,850	8,622
B. Bureau of Public Roads (emergency funds)	1,144,565	59,000	74,307	133,429	200,773	100,648	130,710	94,249	186,148	98,960	66,341
C. Resettlement housing and land development projects of the Farm Security Administration	178,719	—	—	—	—	842	7,755	25,480	46,633	57,987	40,022
D. Projects of other Federal agencies (including miscellaneous non-construction projects)	1,762,028	—	56,501	194,019	259,967	202,397	242,113	279,738	242,357	161,546	123,390
E. Federal loans for public construction (except under the P.W.A.)											
1. Self-liquidating loans of the Reconstruction Finance Corporation (Act of 1932)	258,817	13,358	27,158	25,442	29,663	25,792	33,724	29,990	28,141	27,067	18,482
2. Other loans	1,855	—	—	—	—	—	—	16	462	948	429
VII. Surplus commodities distributed for relief§	426,304	30,469	35,640	50,931	184,890	80,061	11,823	5,898	7,015	11,272	8,305

* The data include expenditures from Federal, State, and local public funds for all types of costs incurred in conjunction with programs listed. Payrolls, materials, administration, and all other items are included with certain minor exceptions noted in the original source. For explanatory notes on component programs, and all technical specifications applicable to these data, see Volume 2, *Hearings before a Special Committee to Investigate Unemployment and Relief, United States Senate*, Appendix 1.

† Data for sponsors' contributions to National Youth Administration work projects for July to December, 1937, are not yet available.

‡ Excess of credits, deduct.

§ This item includes the cost of wheat and cotton purchased with Federal funds and donated to the Red Cross for relief distribution, the purchase and distribution of surplus commodities by the Federal Surplus Relief Corporation and the Federal Surplus Commodities Corporation, purchase by the Agricultural Adjustment Administration of commodities utilized for relief purposes (including the 1934 drought purchase program), and the costs to the Federal Emergency Relief Administration of the care and processing of drought cattle for relief use. Details as to expenditures on these component programs are omitted here because of the limitations of space but can be found in the original source cited in footnote*.

gency public works, which have so frequently represented an immediate alternative to relief grants. It will be noted in Table II that totals which exclude emergency public works and surplus commodities are provided to enable the reader to study trends in a more delimited field.

A third type of problem was associated with the development of a classification by type of program. In the attempt to portray developments over a five-year span, during which many changes in relief agencies and policies have taken place, it seemed important to think of trends in terms of major functional changes rather than in terms of the more fleeting organizational transfers. Only in this manner could the problems involved be seen in their larger outlines. As is usually the case, the effort to see major changes involves oversimplification and arbitrary decisions. In order to establish sharp lines of demarcation between major classes, some of the individuality of agencies' objectives and programs necessarily had to be subordinated, since it did not appear feasible to provide special categories for all shades of programs ranging from direct relief on a very meager level to emergency employment without a means test. If a miscellaneous classification without meaning or practical value were to be avoided, miscellaneous borderline programs, particularly those of small magnitude, had to be placed under headings to which they had some similarity.

A number of alternative principles of classification were also suggested. Because of lack of data most of these proved impractical. A relatively simple list of classes conforming to no single principle of organization was finally adopted. The classification, however, follows in general the form of assistance characteristic of the programs included. The seven major headings utilized are as follows: (1) general relief, (2) Federal work programs primarily designed to employ relief labor, (3) work program of the Civilian Conservation Corps, (4) specialized types of assistance to unemployables (aid to the aged, the blind, and dependent children), (5) loans to destitute and low-income farmers, (6) emergency public works, and (7) surplus commodities distributed for relief.

The timing of expenditure reporting constituted another of the central problems of the study. The need for simultaneous reporting of Federal, State and local expenditures on a comparable basis eliminated at the outset the possibility of obtaining in addition comparability as between programs in the timing of reporting. In the case of each program an effort was made to secure reports timed as nearly as possible in accordance with the date assistance or employment was extended to individuals whom the program was designed to aid. The timing of reporting was varied intentionally as between programs to cor-

respond to the circumstances affecting each program, the nature of the routine statistical procedures in use by each agency, and the availability of comparable data over the five-year time span. The compromises necessitated by these circumstances resulted in the following varied selection of dates chosen for the reporting of expenditures: the date the obligation was incurred by the Federal Government, the date of the Federal grant to a State for a given purpose, the date the obligation was incurred by a State or local government from Federal funds, the date of the completion of the Federal prepayment audit of vouchers, the date of the issuance of the check, the date of the withdrawal of cash from the agency's account for the payment of the check, the date of the completion of a given amount of construction as estimated on the basis of pay rolls issued and materials in place, and miscellaneous additional types. This heterogeneous mixture is admittedly very unorthodox from the point of view of standard accounting procedures. The final totals, therefore, cannot be regarded in any sense as an exact accounting record.

Other difficult problems centered around the necessity for avoiding duplication in the combined statement resulting from the reporting of the same expenditures by two or more agencies. Because of the numerous transfers of funds and the close interrelationships between agencies in the administration of some programs, overlapping between the reports of two or more agencies was surprisingly frequent. As a precaution against the possibility of adding in the same expenditures twice in the combined totals, agencies were requested to incorporate in their reports a number of details on expenditures in relation to appropriation acts. A careful comparative analysis of these reports in relation to comparable totals in published Treasury sources was in some cases necessary to locate and determine the nature and extent of overlapping between reports received. After the type of adjustment which was needed had been clarified, the necessary deductions were arranged in consultation with the agencies concerned. By this method all known duplication was eliminated from the final composite totals. This phenomenon of duplicate reporting, of course, would have been eliminated automatically had Treasury reports on checks issued been used in all cases as a basis for the Federal component of the tabulation.

Another type of difficulty involved the need for securing consistency as to the items included in, or deducted from, total costs. Difficulty in securing reports of administrative items of the type desired was particularly frequent. Lack of comparability also resulted from differences in the treatment of repayments on loans, refunds, proceeds from sales, and other miscellaneous receipts. Since receipts of these types usually

revert to general Treasury funds rather than to the accounts of particular agencies, agency accounts are not in general adjusted to provide for deductions of these types. Reports of land purchases and miscellaneous special programs were also difficult to secure on the basis required by the plan for the table as a whole. In so far as practicable, revised reports were secured to adjust for known and significant deviations from the general plan.

With the exception of these issues, the major tasks involved the interpretation of the purpose of the compilation to the agencies, the development in cooperation with them of plans for specifications satisfactory, in so far as possible, both to the agency and to the Committee staff, and the arranging of the necessary revisions in statements in order to meet more precisely the plan for the tabulation as a whole.

Other lesser complications arose in tracing down minor programs not included in previous tabulations, such as the costs of wheat and cotton purchased with Federal funds and donated to the Red Cross for relief distribution in 1932 and 1933, the costs of surplus commodities distributed for relief, and expenditures for direct relief made by the Office of Indian Affairs from regular funds. At the present time all these programs are of very minor magnitude from the point of view of expenditures, but their inclusion was considered essential to a complete picture and to the accurate portrayal of trends.

It should be emphasized that the result of so many compromises and adjustments to the inadequacies of existing data must of necessity be regarded as an approximation rather than as an exact financial record. The data, nevertheless, are believed to be sufficiently accurate to portray the general trends and the relative magnitudes of component programs.

Moreover, trends in expenditures by themselves have a limited usefulness. They can never be used to indicate either trends in the volume of need or trends in the extent to which need has been met. Trends in expenditures must be studied in relation to trends in case loads, trends in the amounts reaching persons in need, trends in governmental fiscal policies, and trends in related economic and social phenomena if they are to have definitive meaning for social policy. A thorough analysis of these expenditure trends in terms of this larger context is yet to be made.

HOUSEHOLDS AND PERSONS RECEIVING RELIEF OR ASSISTANCE

By T. J. Woofter, Jr. and T. E. Whiting
Works Progress Administration

The task of estimating the number of different recipients of public relief and emergency employment in the United States is beset with many difficulties. Needy persons have been assisted through several programs designed to meet different aspects of the relief problem. Some of these programs have been operated by the Federal Government, some by the states with Federal assistance, and some by the states or their political subdivisions without Federal help. Basic data about recipients are available for most programs, but definitions of the units that are counted differ considerably. More serious problems in the preparation of consolidated totals are the selection of the agencies and activities to be included and the elimination of duplication which arises because families or single individuals often receive assistance from more than one program during the same month.

Nevertheless the need for estimates has been so urgent that the problem has received a considerable amount of attention from the Division of Social Research and the Division of Research, Statistics, and Records of the Works Progress Administration, and from the Division of Public Assistance Research of the Social Security Board. The estimates presented in the accompanying tables and charts were prepared jointly by the two divisions of the WPA in cooperation with the Social Security Board which provided much of the information concerning recipients of aid to the aged, aid to the blind and aid to dependent children, and assisted in the determination of estimates of duplication between these special types of assistance and other forms of public aid.

It is apparent that the best that can be expected at present is estimates of national totals which may be considered a first approximation of the desired result. However, the estimates presented below are believed to be sufficiently reliable to indicate approximately both trends and total volume of the load.

CHANGES REVEALED BY THE ESTIMATES

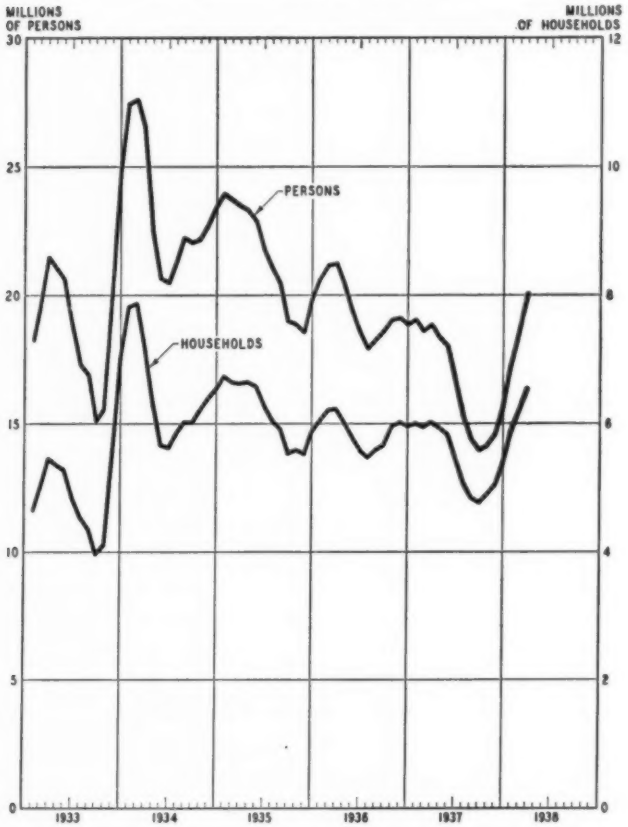
Both of the estimated series shown in Chart I and Table I reflect pronounced seasonal patterns with winter peaks. The series reached their high points for the entire period during the first quarter of 1934 when the Civil Works Program was in operation. In February of that year the estimated net number of persons was equivalent to more than

a fifth of the entire population of the United States. Partly as a result of the 1934 drought, the number of recipients was relatively large during the latter part of that year and the early months of 1935.

The downward movement which gathered momentum during 1935 was much more pronounced when measured in terms of persons than

CHART I

ESTIMATED NET TOTAL NUMBER OF HOUSEHOLDS AND PERSONS RECEIVING RELIEF, WORKS PROGRAM EMPLOYMENT, AND EMERGENCY EMPLOYMENT



when measured in terms of households. The decline from the high point in 1934 to the low point in 1937 is estimated to be 40 per cent in the number of households as compared with a 49 per cent decline in number of persons. The decline in the average number of persons per household, which has been evident since the beginning of the FERA

period may be attributable in part to the separation of two-family households and in part to the increase in the relative number of single persons which accompanied the specialization of assistance programs. It appears that family groups, and especially large families, have been more successful in obtaining adequate earnings from private employment than have single individuals. This might be expected since family groups often contain more than one employable member.

The charts indicate that in September 1937 fewer persons were aided than in any other month covered by the series. During this month the estimated number of persons represented approximately 11 per cent of the population of the Continental United States estimated for 1937. After this date, the number of households and persons increased sharply as a result of the recession in economic activity.

Because of the complexity of duplication between programs it is difficult to represent shifts from one program to another accurately in a simple chart. The distribution by agency in Chart II of the net total number of households was determined by arbitrarily allocating all duplicated households to the Works Program, the CCC, and the public assistance programs of the Social Security Board. The figures for WPA and the Works Program represent gross totals including duplication with all other types of assistance. The numbers shown for the public assistance programs of the Social Security Board exclude duplication between these three categories themselves and duplication with Works Program and CCC employment. For CCC employment the figures represent the total number of households with the exception of those which also received Works Program employment. The figures for Civil Works Program include duplication with general relief. In all other instances the figures do not include households which received more than one type of aid.

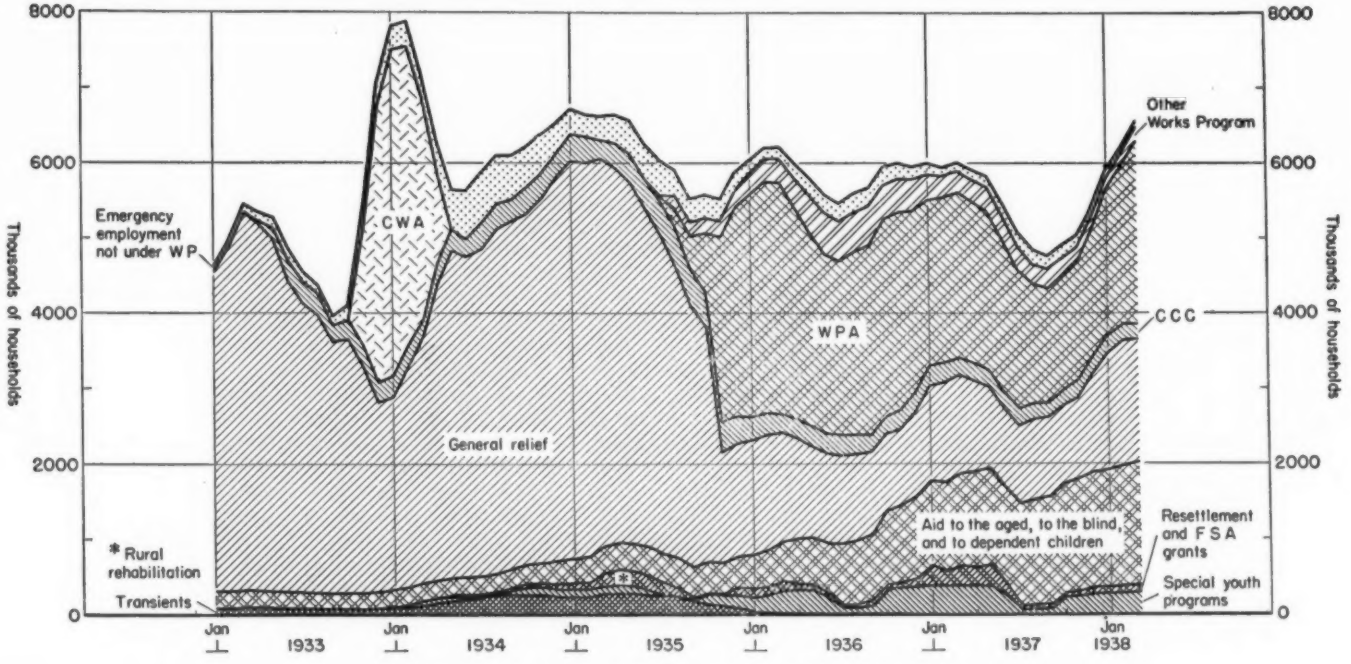
In general, the data plotted for each program contain duplications between this program and all other programs shown below it. This holds for all programs shown except that of general relief which contains households receiving general relief only. Thus, the chart suggests the major shifts between programs but it does not indicate with precision the relationship between an individual program and the net total.

The rapid rise and decline of employment under the Civil Works Program is evident from this chart. Persons aided under the special transient, emergency education and student aid programs while the FERA was in operation were largely absorbed by the programs of the Works Progress Administration and the National Youth Administration during 1935. The rural rehabilitation program initiated by the FERA in 1934 was transferred to the Resettlement Administration in

CHART II

ESTIMATED NET NUMBER OF HOUSEHOLDS RECEIVING RELIEF AND EMERGENCY EMPLOYMENT

January 1933–March 1938



See accompanying text for method of allocating duplicated households.

TABLE I

ESTIMATED NET TOTAL NUMBER OF RELIEF AND NON-RELIEF HOUSEHOLDS AND PERSONS THAT RECEIVED RELIEF, WORK PROGRAM EMPLOYMENT AND EMERGENCY EMPLOYMENT

Preliminary figures, Continental United States, January 1933 to March 1938
(000 omitted)

Month	Households	Persons	Month	Households	Persons
1933			1936		
January	4,647	18,224	January	6,044	20,633
February	4,968	19,510	February	6,209	21,192
March	5,463	21,479	March	6,229	21,243
April	5,349	21,046	April	6,018	20,450
May	5,275	20,653	May	5,809	19,414
June	4,851	18,839	June	5,587	18,517
July	4,551	17,286	July	5,477	17,900
August	4,372	16,895	August	5,602	18,286
September	3,973	15,071	September	5,670	18,615
October	4,116	15,596	October	5,958	19,048
November	5,403	19,787	November	6,005	19,113
December	7,062	24,802	December	5,968	18,872
1934			1937		
January	7,821	27,449	January	6,000	19,050
February	7,879	27,606	February	5,954	18,614
March	7,169	26,495	March	6,015	18,846
April	6,270	22,448	April	5,929	18,373
May	5,658	20,648	May	5,744	17,541
June	5,631	20,475	June	5,473	16,783
July	5,872	21,352	July	5,069	15,266
August	6,106	22,244	August	4,849	14,380
September	6,111	22,065	September	4,764	13,987
October	6,220	22,204	October	4,907	14,135
November	6,391	22,758	November	5,041	14,597
December	6,547	23,475	December	5,390	15,603
1935			1938		
January	6,727	23,964	January	5,904	17,314
February	6,651	23,716	February	6,231	18,502
March	6,630	23,492	March	6,544	20,112
April	6,650	23,357	—	—	—
May	6,575	22,934	—	—	—
June	6,258	21,769	—	—	—
July	6,033	21,042	—	—	—
August	5,916	20,461	—	—	—
September	5,539	18,998	—	—	—
October	5,588	18,879	—	—	—
November	5,528	18,604	—	—	—
December	5,886	19,851	—	—	—

1935, which subsequently was succeeded by the Farm Security Administration.

The development of the Works Program beginning with the Summer of 1935, and of the public assistance programs of the Social Security Board in 1936 resulted in extensive transfers of general relief cases. While some of the increase in the programs of the Social Security Board resulted from such transfers, it is believed that a considerable portion of the persons benefited had not previously received general relief.

The distribution of the component statistics and the net totals after duplications are eliminated are shown for March 1938 in Table II.

COVERAGE

The agencies included in the series and the source of basic recipient data are shown in the stub of Table III. The principal problem arising

TABLE II

ESTIMATED NET NUMBER OF RELIEF AND NON-RELIEF HOUSEHOLDS AND PERSONS THAT RECEIVED RELIEF, WORK PROGRAM EMPLOYMENT AND EMERGENCY EMPLOYMENT DURING MARCH 1938

Preliminary figures, by programs, Continental United States
(000 omitted)

Agency or Program	*Households*	*Persons*
General Relief	2,000	6,400
Civil Works Program	—	—
Works Progress Administration	2,442	9,666
Civilian Conservation Corps	297	1,148
Aid to the Aged, Blind and Dependent Children	1,785	2,972
Transient Relief	—	—
Rural Rehabilitation Advances (FERA)	—	—
Farm Security Administration Grants	126	630
Student Aid	323	323
National Youth Administration Work Projects	153	165
*Net Total Relief Programs**	6,307	19,305
Other Works Program	201	729
*Net Total Relief and Works Program**	6,478	19,914
Emergency Employment of Other Federal Agencies	66	198
*Net Grand Total**	6,544	20,112

* Does not equal the sum of the totals shown for individual agencies and programs because allowance has been made for duplication.

in connection with the selection of agencies resolves itself into the question of whether or not to include only those agencies which required as a prerequisite for employment that need for relief be demonstrated. Agencies such as CCC, PWA and the Bureau of Public Roads did not require certification of need for relief until they were incorporated in the Works Program in 1935 and CWA never required it. In order to obtain a maximum of comparability relief and non-relief employees of all agencies providing emergency employment have been included.

It will be noted that the arrangement of activities in Table II permits the exclusion of both "Emergency Employment" and Works Program activities conducted by Federal agencies other than those included in the first sub-total. The item "Emergency Employment" shown in Table II covers that provided with Reconstruction Finance Corporation funds and employment of the Bureau of Public Roads and Public Works Administration financed from all funds other than those appropriated by the Emergency Relief Appropriation Acts. Employment provided under the Emergency Relief Appropriation Acts which is usually designated as "Works Program" employment has been included in the preceding subtotals.

The monthly figures for the number of recipients aided by each agency do not include administrative employees but insofar as feasible they do include all recipients of relief, works program and emergency employment wages. Except during the CWA period, a large number

TABLE III

SOURCE OF DATA ON NUMBER OF RECIPIENTS AND EXTENT OF DUPLICATION

Agency or program	Source of recipient data	Types of duplication				
		General relief	Civil Works Program	WPA and other Works Program agencies	CCC	Aid to the aged, to the blind, and to dependent children
(1)	(2)	(3)	(4)	(5)	(6)	(7)
General relief	FERA official reports until March 1937. Subsequent months from Social Security Board reports		(a)	(a)	(b)	(a, b, c)
Civil Works Program	Official CWA reports. The figure used is the maximum weekly employment	(a)		(d)	None	None
Works Progress Administration	Official reports of WPA, the figure used is the maximum weekly employment	(a)	(d)		(b)	(b)
Other Works Program agencies	Official reports of WPA, the figure used is the maximum weekly employment	(a)	(d)	None	(b)	(b)
Civilian Conservation Corps	Estimated monthly average derived from official reports of the CCC	(b)	None	(b)		(b)
Transients	Estimates prepared in part by WPA, Division of Social Research and in part WPA Division of Research, Statistics, and Records	(a, b)	None	(a, b)	None	None
Aid to the aged, to the blind, and to dependent children	Estimates for 1933 through 1935 by WPA Division of Social Research, 1936–1938, from Social Security Board reports	(a, b, c)	None	(b)	(b)	
Resettlement and Farm Security Administration grants	Resettlement and Farm Security Administration official monthly reports	(b)	(d)	(b)	(b)	(b)
Special youth programs	FERA Student Aid—official monthly reports of FERA NYA Student Aid and Work Projects, official monthly reports to WPA	(a)	None	(a, b)	None	None
Rural Rehabilitation	FERA official monthly reports until July 1935. Subsequent months estimated by WPA, Division of Research, Statistics, and Records	(a)	(d)	None	None	None
Emergency employment of Federal Agencies other than under the Works Program	Reports of the Bureau of Labor Statistics and the Bureau of Public Roads	None	None	None	None	None

(a) WPA, Division of Research, Statistics, and Records.
(b) WPA, Division of Social Research.
(c) Social Security Board, Division of Public Assistance Research.
(d) Not operating concurrently.

of the non-relief persons allowed for in the estimates were skilled and supervisory employees necessary to the operation of the works programs. It is probable that many of the non-relief persons included in the tabulation were either at or near relief levels. It is certain that their employment on public projects resulted in their temporary removal from the labor market.

Some activities have not been included because no comprehensive statistics are available. Such activities include veterans' aid, cases receiving hospitalization only, burials and institutional cases such as inmates of poor-farms which have been excluded by definition from reports submitted to Washington. It is believed, however, that they are not of sufficient relative importance to alter the totals appreciably. Persons who received surplus commodities only are excluded for the same reason. A special survey made by the Works Progress Administration indicated that approximately 250,000 families received only this type of aid during December 1936. The estimates also exclude recipients of unemployment compensation.

Relief given by private agencies is also excluded. Rough estimates prepared by the WPA indicate that this type of assistance reached a peak of around 600,000 households early in 1933 after which it declined to an average of about 100,000 to 150,000 households in 1935, 1936 and 1937. These estimates, which in their present form are tentative, are not included. It is believed that a relatively large proportion of private relief cases also received public aid. But even the gross totals are small in comparison with the totals for public relief recipients.

ESTIMATING THE NUMBER OF HOUSEHOLDS AND PERSONS

Most of the major agencies have maintained continuous records of the numbers of recipients benefiting from their activities. As might be expected, these records were usually designed to meet the current administrative needs of the operating agencies, with the result that wide differences exist in the characteristics of data available for the various programs. For example, figures for the Civil Works Program represent the number of different persons employed at any time during the week while those for the aid to dependent children program of the Social Security Board represent the number of different families and the number of different children aided at any time during a month.

The estimates have been expressed in terms of both the number of households and the number of persons, or individual members of households, who were aided at any time during a calendar month.

These units are essentially the same as the case and person units used in reporting general relief activities which from 1933 through 1935 were financed largely with funds granted by the FERA. For a number

of other programs it was necessary to select from the various available figures a series which most closely approximated these common denominators. For example, the number employed during the peak week of each month was utilized for the Civil Works Program and for employment provided by the WPA and other Federal agencies participating in the Works Program. It is recognized that this procedure results in a slight understatement since some individuals who were not employed during the peak week of a month may have worked during other weeks of the same month. It does not seem desirable, however, to make a statistical adjustment for this factor.

More than one member of a household may be enrolled in CCC camps. On the basis of surveys conducted by the WPA, a special series representing the number of different households of which CCC employees were members was prepared. Through the cooperation of the Social Security Board a similar adjustment was made for recipients of old age assistance, since some of the individuals reported as receiving this form of aid are members of the same household. In the case of aid to dependent children, data on the number of families in which children were aided were used as representng households. Studies of data pertaining to other programs indicate that adjustments of this type are not necessary.

Estimates of the number of persons are considered to be of importance because they can be related to the total population of the country and because they reflect changes in the size of households which receive public aid. The number of individual persons benefiting was reported monthly for the general relief program. For most activities, however, it was necessary to prepare estimates, on the basis of FERA experience. For example, it was assumed that the average number of persons represented by households that received subsistence grants made by the Resettlement and Farm Security Administrations was the same as the number reported for the rural rehabilitation program of the FERA. During each month that the program was operated by the FERA the average family aided contained 5 persons. It was also possible to determine the number of persons represented by employees of the emergency work relief program conducted by the FERA and it was assumed that these ratios were typical of CWA, WPA and other Works Program employment. In a number of instances it was possible to verify estimates of the number of persons per household by comparison with tabulations covering sample rural and urban areas.

DUPLICATION

Each time that a new program was established or an old program expanded or contracted many persons who were transferred received

one type of assistance during the first part of a month and another type during the latter part of the same month. Each agency reported them as receiving aid during the month. Duplication of this type was especially large during the period when the Works Program was expanding rapidly since it was common practice to continue general relief to persons assigned to work program projects until they actually received a check which was sufficiently large to meet their current needs. A second type of duplication exists when families who are unable to obtain adequate assistance from one agency receive supplemental aid from another concurrently. For example, a family which has a son in a CCC camp may also receive general relief or some other type of assistance. The types of duplication eliminated are shown in Table III. A detailed description of each method would prove too long for this article.

Duplication between general relief and Works Program employment was estimated in part from monthly reports prepared by various states which were requested to furnish this information. While for most months these reports have covered a large portion of the total duplication, it has been necessary to supplement this information with data pertaining to the turnover of Works Program employment. A more detailed discussion of the method of eliminating this and other forms of duplication may be found in the *Monthly Report of the FERA* for June 1936.[1] Information concerning duplication between various types of public assistance programs for aid to the aged, the blind, and dependent children was calculated for 1933, 1934, and 1935 from studies made in the Division of Social Research—one conducted in 13 cities furnishing an urban factor and one in 67 rural counties a rural factor. Later factors were estimated by the Division of Public Assistance Research of the Social Security Board on the basis of state reports showing the amount of duplication. In eliminating this duplication the first step was to estimate the intercategory duplication between the aged and other categories, the blind and other, and the dependent children and other. Then, duplication between the categories and other agencies was estimated.

Allowance was also made for duplication in the data reported for the Civil Works Program, CCC, transient relief, student aid, and NYA work projects, through the use of information obtained from special tabulations prepared by the WPA.

[1] See Emerson Ross and T. E. Whiting, "Changes in the Number of Relief Recipients," *Monthly Report of the FERA*, June 1936, pp. 1–21. Although the estimated totals presented in this report are more limited in scope than those presented on the accompanying pages, essentially the same processes were used to eliminate duplication between general relief cases and persons employed under the Civil Works Program and the Works Program.

RESIDUAL RELATIONSHIPS AND VELOCITY OF CHANGE AS PITFALLS IN THE FIELD OF STATISTICAL FORECASTING*

By Leon E. Truesdell
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The term residual relationship is intended to cover those cases where, in a statistical classification, the item upon which attention is focused represents a relatively small amount left over after some other item is subtracted from the total. In many instances, though not always, the residual items represent concepts which are negative in character. Typical negative residual concepts are illiteracy, inability to speak English, and unemployment; a residual concept which is not negative is that of the number of migrants obtained by computing the survivors from one census in a given area and comparing them with the actual count at the next census.

Illiteracy. Let us consider further the first example mentioned. An illiterate person is defined as one who is not able to read and write. The whole number of illiterates is therefore what remains after the number of persons returned as being able to read and write is subtracted from the total population—both counts being limited in census practice to persons 10 years old and over. A typical percentage of *literacy*, that is, of persons 10 years old and over who *are* able to read and write, is about 98.8; this leaves 1.2 as the percentage of illiteracy, or 12 illiterate persons in each 1,000 of the population. Obviously, if 6 more persons in each 1,000 should learn to read and write, the effect on the percentage of literacy would be slight, simply bringing it a bit closer to the 100 per cent which it already approximates. But the subtraction of 6 persons from the illiterate group reduces that percentage by one-half, or from 1.2 to 0.6.

Again, suppose that in preparing the census schedules for tabulation it were discovered that for an occasional person there was no answer to the question as to whether able to read and write; and suppose, further, that it were proposed to count these blanks, or failures to reply, as negative answers. (One might question the wisdom of such a procedure, but there would be in its favor at least the argument that a person who did not know how to read and write would be much more likely to decline or neglect to answer this question than one who did.) Let us assume that for the first 1,000 persons reported in a given area the answers to the literacy question comprise 975 Yes's, 12 No's, and

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 29, 1937.

13 blanks. If we include the blanks with the Yes's, giving these cases the benefit of the doubt, we get 1.2 per cent illiterate; if we omit them altogether and compute the percentage on the basis of the 987 definite answers returned, we still get 1.2 per cent; but if we count the blanks as No's, we get 2.5 per cent illiterate, or more than twice as much as by the other methods. Evidently, the method of handling the blanks in this tabulation has a tremendous bearing on the percentage of illiteracy. On the other hand, it makes very little difference in the percentage of *literacy* whether the blanks are included or not. The fundamental reason for this is that the number of blanks is a function of the entire number of units canvassed, and where the residual is very small, as in the case of illiteracy, the number of blanks tends to be overwhelmingly large in relation to the residual.

In actual census procedure the blanks in the returns for literacy, which are not very numerous, are included with the Yes's; and since in the general tables there is no publication of the number or percentage of persons who are literate, the blanks disappear from the picture altogether. But it would be possible to find many cases in actual statistical practice where the method of disposing of blanks or doubtful cases is exactly parallel with the hypothetical process of counting the blanks with the No's which has just been outlined.

Unemployment. The concept of unemployment is now in process of radical change, as a result of recent and current economic conditions, especially of the rise of a large group of first-job-seekers, or persons who have never worked for pay; and one would hesitate to offer a definition that would be currently satisfactory. But under conditions as they existed in 1930 the concept was fairly clear-cut. The typical unemployed person then was a person who had had a job, had lost it, and was trying to get another job. The unemployed thus formed a residual class comprising what was left of the whole number of gainful workers after those still at work were taken out. This concept formed the basis of the unemployment censuses of 1930 and 1931.

The relations already illustrated for the concept of illiteracy hold good for the concept of unemployment under such a definition. With nearly 50,000,000 gainful workers, that is, persons who usually work, and only 2,500,000, or 5 per cent, out of a job, it is evident that a 6 per cent decrease in employment would more than double the number and percentage of unemployed; or, conversely, that a 6 per cent increase in employment would wipe out the unemployment altogether.

When the tentative plans for the 1930 census of unemployment were under discussion in 1928 and 1929, one of the reasons advanced to justify the taking of such a census was that the resulting figures would

be useful, not only as indicating the extent of unemployment in 1930, but as a starting point for a series of annual estimates of unemployment. In those early days, however, no one realized what a serious pitfall for prospective estimators might be found in the residual nature of the unemployment concept, if the attempt were made to use it in combination with the current indexes of employment. Failure to recognize this danger led to a serious error in connection with the initiation of one of the now currently accepted series of unemployment estimates.

As a starting point for the series of estimates just referred to, the census unemployment classes were regrouped for the purpose in hand in a manner quite reasonable and satisfactory; and the basic assumption (also probably justified) was made that the unemployment census in the 19 cities in 1931 was possibly more reliable, so far as it went, than the country-wide enumeration in 1930. At this point, however, the marginal nature of the unemployment data began to make trouble. The next step was to compute the percentage of *employment* on the basis of the difference between the number of gainful workers in 1930 and the number returned as unemployed in the 19 cities covered by the 1931 census, for both 1930 and 1931. These cities were considered as representative of the whole country, in spite of the fact that they contained only about one-sixth of the entire population, with no representation for rural areas.

Next, the relation between these two percentages of employment, the one for 1930 and the one for 1931, was compared with a composite index of employment based on sample returns from a list of principal industries which omitted entirely industries employing more than 40 per cent of all gainful workers.

The computations based on census figures indicated that 1930 employment was 116.49 per cent of 1931 employment, while the composite index, based on limited sample returns from an incomplete list of industries, showed 1930 employment to be 114.75 per cent of 1931. The difference was thus less than 2 per cent, and one would think that the obvious conclusion from this comparison would have been that, testing the employment index against the showing of the census, the index had done very well indeed to come so close; and that if anything were to be "corrected," it should be the index.

But not so. The maker of unemployment estimates, in order to close up this gap of less than 2 per cent between the census ratio and the index, proceeded to add a cool million, or nearly 30 per cent, to the unemployed laboriously counted in the 1930 census.

There are other elements subject to criticism in the process under consideration besides the one which rests on the failure to recognize

the residual nature of the unemployment concept, but this one seems to occupy the center of the picture.

Migration. The process of estimating the migration into or out of a given area between one census and another by computing survivors from the first census to the date of the second, is another example of residual relationship, subject to almost as many possibilities of misleading results as those involving narrow margins of a negative character.

The process and some of its dangers may be illustrated as follows: Suppose that Blank County had a population of 20,000 in 1920, and that the number of survivors from 1920 to 1930, computed on the basis of standard expectations, was 18,000. Suppose further that the 1930 census returns showed 18,300 persons 10 years old and over. This would seem to indicate a net migration of 300 such persons into the county during the decade. But suppose a question is raised as to the applicability of the standard expectation of life to Blank County, and that it is finally shown that the death rates in this county are appreciably higher (or lower) than those on which the standard tables are based, and the survival rates, therefore, correspondingly lower (or higher). An error of only 2 per cent in the computation of survivors will either wipe out entirely the assumed migration in, or more than double it.

Velocity of change. In putting together in my title the ideas of marginal relationships and velocity of change, it may be that I have tried to join two concepts which may have little in common except that they are both sources of difficulty in statistical forecasting. And I may be adopting an unduly pretentious terminology for sources of difficulty already too familiar. But let me try to make clear by an illustration what I mean by velocity of change.

Twenty years ago there were half a dozen roads leading northward from the city of Washington on which, shortly after crossing the District line, one found oneself in the open country with fields and areas of forest land along the way. Fifteen years ago the general situation was still the same; and ten years ago; and five years ago. Through all this period new houses were being built along these roadways; one house here this year, another house there the following year, and so on, with ample time for the lover of empty, unbuilt-up country to get used to the gradual encroachments.

But since about 1934 things have been different. On some of these roads new houses are springing up all along the way for 5, or 10, or even 15 miles out. And it is no longer a single house here and there;

there are groups of houses, rows of houses, and whole blocks of little houses set close together in the midst of wooded areas which ought to have been reserved for two or three homes with ample space around them.

In one sense this recent movement is not a new one, since the country has been gradually building up all along; but in the past two or three years the process has been so much speeded up that one does not recognize it. More new houses have been built in six recent months than in the whole 20 years ending in 1934. This is the sort of thing that may take place in any of the fields wherein statisticians try to forecast the future.

There are frequent demands, not only for estimates of the current population of cities (which can eventually be supplied on the basis of current local data collected and standardized), but also for long-time forecasts of what the population will be 20, 30, or 40 years into the future.

There still remains a tendency to base forecasts of the future on past rates of increase, though where these rates have been high, the very absurdity of the resulting forecast has brought with it some degree of caution. If the city of Dearborn, Michigan, for example, should increase in population at the same rate in the next three decades that it did between 1920 and 1930, it would have, in 1960, a population of more than 400,000,000, or about three times our best estimate for the United States as a whole.

The standard method of making official estimates of population for intercensal years up to 1926 was the so-called arithmetic projection method, which assumed that the numerical increase in the population of a place or of a State in each year subsequent to the latest census was the same as the average per year for the last completed census decade. In other words, it assumed that the population increase continued at practically the same rate as before. (The arithmetical additions amount to slightly less than geometric additions—that is, additions of the same percentage each year as the average percentage for the last completed decade; but except for cases of very rapid increase, the difference is negligible.)

In 1926 a new method of estimating the national population was adopted, based on births, deaths, and net immigration. With restricted immigration and declining birth rates, the annual increments, especially after 1930, were much smaller than the average for the preceding decade; and the projected increases for States and cities were scaled down in proportion. This was a partial recognition of a modi-

fication in the velocity of change; but it still left the changes traveling in the same direction, with a rapid increase allotted to that State or city which had had a rapid increase, or vice versa.

On the basis of general information, supported by fragmentary statistics, we felt certain that there had been a general movement of population out of many industrial cities into rural areas between 1930 and 1933, or at least a general cessation of the usual cityward movement, which since 1933 may safely be assumed to be again in operation. After 1933, because of this situation, we stopped making estimates for cities on the basis of past performance.

The falsity of the assumption of continued movement in the same direction, even, let alone at the same velocity or even at the same velocity modified by a uniform reduction factor, is sufficiently demonstrated by the cases of two large cities which have had censuses since 1930. The 1933 estimate for Chicago was 3,490,700, and that for 1934 carried forward by the same method would have been 3,528,705, representing an increase over 1930 of 152,267. An actual census of Chicago taken in 1934, however, showed only 3,258,528, representing a decrease of 117,910 since 1930. The case of Detroit is even more striking, since that city had both a very rapid increase from 1920 to 1930 (thus establishing a high velocity of increase) and a very severe reaction to depression conditions. The 1935 estimate for Detroit would have been 1,728,577, representing an increase of 159,915, while an actual census taken in 1935, after at least a year of rapid recovery, showed only 1,469,066, or 99,596 less than in 1930.

Evidently the possibilities for sudden changes, for reversal of trends, and for growth in new directions—or for a cessation of growth in the old directions—which have come with the speeding up of mechanical processes and commercial activities, have made it no longer safe to base forecasts directly and solely on past records; have made even the most carefully constructed "normal curve" of little more service than a medieval suit of armor in front of a Japanese machine gun.

For the larger areas, to be sure, especially for the United States as a whole, one may still base computations of probable future performance on what has been done in the past—with rather extensive allowances for a slowing down in one factor and an inevitable speeding up in another. This is possible partly by reason of the greater stability of large quantities under any process of change; but more because the factors which produce such radical differences in the rate of change in cities and even States are *internal* factors, taking away from one area (or many areas) what might have come to it (or them) and di-

verting the current towards another area, but all within the boundaries of the country as a whole.

The way out of the difficulty seems to be, therefore, to devote more study to the underlying factors which tend to divert population (or trade, or manufacturing production, or anything else) from one area to another, and thus to speed up or retard the velocity of change in the elements for which the forecast is required. And since the factors thus to be studied are numerous and closely interrelated, both among themselves and in the different areas in which they operate, it would seem that large-scale, coordinated study would have more promise of success than that which could well be undertaken in the interests of one organization in one area alone.

THE RELIABILITY OF PRELIMINARY PRICE INDEXES

By Walter B. Garver
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A considerable number of price reporting agencies are currently computing price indexes using the type of construction generally known as the "Fisher ideal formula," expressed in symbols by the formula

$$\sqrt{\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1}}$$

where p_1 and p_0 are the prices of the commodities in the current and base periods, respectively; q_1 and q_0 are the quantity weights of the commodities in the current and base periods, respectively. This is, of course, a geometric mean of two ratios, one of which is a ratio of the aggregate value of a bill of goods sold in a base period and priced at current prices, to a similar aggregate value of the same bill of goods priced at base period prices. The second ratio is that of the aggregate value of a similar bill of goods sold in the current period and priced at current prices to the aggregate value of the same bill of goods priced at base period prices. Obviously if the quantities of identical items sold were the same in the current and base periods the ratios would be identical and there would be no point in taking a mean of identities. But there are usually discrepancies between these quantities, and when these become substantial there is raised against the use of either ratio alone as a price level indicator, the objection that neither of them is adequate, that each omits a part of the truth.

It was in part to meet this objection that the "ideal formula" has been rather widely used, since this type is a "cross" between two ratios which are subject to opposite errors. But the question frequently has been raised as to whether the closer approximation obtained by the use of this formula is worth the added labor involved; that is, in contrast to an index that is a ratio of aggregates, $\Sigma p_1 q_0 / \Sigma p_0 q_0$. The problem is essentially a matter of weights. When a large number of commodities enter into the aggregates it becomes a laborious task to assemble the current weights. For some of the items there may be a lack of reliable statistics from which to derive quantities, necessitating estimates by devious, if not highly questionable methods. Where reliable statistics are available they are frequently so slow in coming through the mill that they are not available for use until the time of

maximum usefulness of the index number is well into the past. As a test, therefore, of the value of the added labor involved in the "ideal formula" computation a comparison is made in this study of the "ideal formula" computations and the indexes arrived at by the single ratio of aggregates using only base quantities, $\Sigma p_1 q_0 / \Sigma p_0 q_0$.

The Minnesota Farm Price Index Number is an example of the use of the "ideal formula." The index includes sixteen items, which contribute about 95 per cent of the state's agricultural income. The crop items include: wheat, corn, oats, barley, rye, flax, potatoes, and hay. The livestock items are hogs, cattle, calves, and lambs-sheep. Butterfat, milk, chickens and eggs constitute the list in the livestock products group. This index number has been computed back to 1910 and is published currently. The first half of the formula, $\Sigma p_1 q_0 / \Sigma p_0 q_0$, is published monthly under the caption "preliminary farm price index," and uses current prices and base period quantities. The tests were made to measure the accuracy of this simple ratio as a forecaster or indication of the final index computed by the "ideal formula." The period included in the study was 1910–1935 inclusive, with a total of 312 readings.

TABLE I
A COMPARISON OF ERRORS IN MINNESOTA MONTHLY FARM PRICE INDEX NUMBER

Reading	Preliminary index	Final index	Difference points	Percentage difference
High months				
Feb., 1918	150.3	153.2	2.9	1.9
Mar., 1918	140.9	147.9	7.0	4.7
Apr., 1918	141.8	145.4	3.6	2.5
Aug., 1918	143.4	141.4	2.0	1.4
Dec., 1918	149.6	147.7	1.9	1.3
Low months				
Oct., 1932	36.5	37.9	1.4	3.7
Jan., 1933	34.6	36.2	1.6	4.4
Sept., 1933	60.5	57.5	3.0	5.2
Oct., 1933	52.0	50.0	2.0	4.0
Nov., 1933	50.3	48.5	1.8	3.7

A simple numerical difference between the preliminary and final indexes would of course give a rough notion of the amount of error in the preliminary index. But the limitations of such an analysis may be seen from Table I, where the preliminary and final readings for selected high and low months have been compared both as to the arithmetic error between the preliminary and final figures and the percentage the error is of the final index. An error of seven points in March 1918 was of relatively less importance than the 3 point difference for September, 1933. While this illustration magnifies such discrepancies (arising from different price levels) over the average situation, it was nevertheless decided to eliminate them entirely. Therefore the method chosen for

the tests was, as indicated in the percentage columns of the table, to express the preliminary indexes as a percentage relative of the final index, and to treat the deviation of this relative from 100 as the error of estimate.

Analyzed in this way, the errors for the period of 312 months averaged 1.2 per cent. The standard error of estimate of the preliminary index was 1.7 per cent for the period. Sixty-two per cent of the errors were less than 1 per cent. There could scarcely be made a reasonable complaint against a preliminary figure with an error of one per cent, or less. But it is in the remaining 38 per cent of the readings that the larger errors occur, ranging up to 8 per cent. The frequencies of such errors at given magnitudes are shown in Table III.

In order to locate the points of greatest variation in this index the indexes of the three groups composing the total, separately computed but using the same methods and identical data, were subjected to the same analysis as was given the index of the entire 16 commodities. Table II shows the results for the three groups and the total index.

TABLE II
COMPARISON OF ERRORS IN PRELIMINARY PRICE INDEXES FOR 3 GROUPS

Index	Average error, per cent	Standard error of estimate, per cent	Percentage of errors under 1 per cent
Crops	1.8	2.3	59
Livestock	0.9	1.4	71
Livestock products	0.5	1.2	91
Total, 16 commodities	1.2	1.7	62

The results set forth in this table clearly reveal differences in physical quantities of marketings (the weights for prices) with which every student of agricultural economics is familiar. The crops group index is subject to the widest errors because the marketings are varied considerably by drought and growing conditions in addition to year to year shifts or changes in production. Moreover, there has been, in Minnesota, during the period covered in this study, a considerable shift away from cash crops to feed crops. Livestock production is less subject to weather and crop-growing conditions, and accordingly shows less variation in marketings, resulting in smaller errors for the preliminary price index as indicated in Table II. The smallest errors occur in the livestock products index, which is heavily weighted with dairy products, the most stable of the three production groups. Variations in the seasonal rates of marketing of all the various commodities also

give rise to shifts in the current weights for the indexes. The frequencies of errors in these groups, by magnitude, are given in Table III.

TABLE III
FREQUENCIES OF ERRORS IN MINNESOTA PRELIMINARY FARM PRICE INDEXES

Percentage error of preliminary index	Total, 16 commodities	Crops	Livestock	Livestock products
0.0–0.4	108	48	154	235
0.5–0.9	87	76	67	48
1.0–1.4	36	48	33	16
1.5–1.9	26	41	21	5
2.0–2.4	22	22	13	0
2.5–2.9	9	18	5	2
3.0–3.4	4	20	5	0
3.5–3.9	3	14	3	0
4.0–4.9	10	10	8	1
5.0–5.9	4	10	1	1
6.0 & over	3	5	2	4
Total	312	312	312	312

The conclusions to be drawn from this examination, in their application to specific indexes, depend of course upon the types of quantities to be priced, and the ultimate uses to be made of the index. For an index of which it is important that there be prompt current calculation and publication, having not very great fluctuations of weights in the basic data, intended primarily or exclusively as a price index, this study would seem to justify the contention that the extra labor involved in the "ideal" formula method contributes, on the whole, very little to the value of the index. Some price indexes are subject to very minor error throughout the major part of their readings and hence offer a satisfactory figure when computed by the less laborious method of a single ratio of aggregates of values of base weights at current prices. But in the index number here studied the errors at certain times resulted in rather serious misstatement, serious enough to justify the added labor involved in using current weights.

One of the great advantages of the "ideal" index formula is the "factor reversal" aspect. If an index is to have other uses than simply to show current price levels, such uses preclude calculation by the simple ratio method alone. By a rearrangement of factors the Minnesota Index is used to show indexes of value of marketings, that is $\Sigma p_1q_1/\Sigma p_0q_0$, and of physical volume of sales,

$$\sqrt{\frac{\Sigma p_0q_1}{\Sigma p_0q_0} \times \frac{\Sigma p_1q_1}{\Sigma p_1q_0}}$$

In all cases where there is prospect of using the indexes to show value and quantity changes in addition to price levels the factor reversal

possibility becomes a distinct advantage favoring the "ideal" formula and justifying the additional labor.

It is believed that this study affords a fair measure of the reliability of preliminary price indexes. It is taken from actual rather than hypothetical cases. It covers a period of extreme fluctuations in price level. The quantity weights are characterized by very pronounced shifts away from base period proportions. Finally, the month to month, seasonal rates of marketing have varied considerably. Thus there were present three factors tending to maximize the errors in the preliminary index.

VARIATIONS IN FAMILY LIVING EXPENDITURES*

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U. S. Department of Agriculture

In the analysis of expenditure data from the Study of Consumer Purchases[1] some attention has been given to the problem of measuring the dispersion of expenditures for the main groups of items in family living and the relationship of the dispersion to the principal categories of analysis which have been established for this study. In many communities the number of families in each income class is large enough to permit a study of the relation of the dispersion of expenditures not only to income but also to other factors affecting consumption, such as occupation and family composition. Accordingly, the standard deviations of the 15 principal groups of expenditures have been calculated for all classes of families in three groups of communities, comprising four small cities in Oregon and Washington, 24 villages on the Pacific Coast, and four farm counties in Pennsylvania and Ohio.

The relationships found between the distribution of family expenditures within classes and the factors of income, occupation, and family composition have a theoretical interest for students of family consumption. In addition they have a distinct practical value in providing a basis for estimating the standard deviations for a much larger part of the data.

Almost without exception the standard deviations of all expenditure groups tend to vary with the income class nearly in proportion to their means. Thus the coefficient of variation fluctuates around a constant value independent of the income class. When lines were fitted to the means and standard deviations of 15 expenditure groups for nine classes of families in the small city community and for seven classes of families in the farm community, the value of the constant term was found to be significantly different from zero in only a few cases. In these cases, of which an example is given in Figure 3, the coefficient of variation shows a tendency to decrease with higher values of the mean. These exceptions, however, are not associated with the same expenditure group in the three communities and therefore it is probably safe to disregard them. The scatter diagrams for the other expenditure

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 30, 1937.

[1] The Study of Consumer Purchases was conducted cooperatively by the Bureau of Home Economics of the United States Department of Agriculture and the Bureau of Labor Statistics of the United States Department of Labor with funds supplied by the Works Progress Administration. The National Resources Committee and the Central Statistical Board cooperated with the operating agencies in the formulation of plans and the development of technical procedures.

groups given in the chart illustrate how well a straight line through the origin fits the data. For all expenditure groups the points which deviate the most from the line represent classes in which the number of families reporting was small. Since this tendency for the coefficient of variation to approach a constant appears in the expenditure data for communities as different as the Northwest small cities and farms in Pennsylvania and Ohio, it seems reasonable to assume that the relationship holds in general for small city, village, and farm communities included in this study and to use the coefficients of variation for a few income classes as estimates for those of other income classes.

To test whether the coefficients of variation vary with occupation or with family type, the Method of Ranks developed by Mr. Milton

TABLE I

COEFFICIENTS OF VARIATION OF EXPENDITURES FOR CLOTHING AND MEDICAL CARE: FAMILIES WITH ONE OR TWO CHILDREN UNDER 16, OREGON AND WASHINGTON SMALL CITIES, 1935–1936

Income class	Clothing			Medical care		
	Wage earner	Clerical	Business and professional	Wage earner	Clerical	Business and professional
$ 750–$1000	45	55	50	114	93	66
1000– 1250	42	39	35	93	106	134
1250– 1500	38	41	48	93	89	68
1500– 1750	47	28	35	106	60	92
1750– 2000	44	43	46	85	108	58
2000– 2250	44	38	48	122	80	93
2250– 2500	46	43	46	43	65	89
2500– 3000	42	47	49	94	146	92
3000– 3500	37	25	36	78	92	80
3500– 4000	—	—	45	—	—	156
4000– 5000	—	—	49	—	—	122

Friedman[2] was used. Only in the case of tobacco expenditures were significant differences found in the coefficients of variation for the three occupational groups, wage earner, clerical, and business and professional. Table I illustrates the similarity in the coefficients of variation for the three occupational groups for one of the less variable expenditures, clothing, and for medical care, the most variable of the large expenditure groups. This similarity among the occupational groups may be a consequence of the broad classification used or may reflect the fact that in smaller communities there is less tendency for families in different occupational groups to diverge in their consumption patterns.

When the relation of dispersion to family type was tested, differences were found in the coefficients of variation for a number of expenditure groups. These groups include food, clothing, household operation,

[2] "The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance," this JOURNAL, 32 (1937) 675–701.

medical care, personal care, and gifts. Some of the family types defined for the purpose of classification are more homogeneous than others.[3] It is in these types that the coefficients of variation have somewhat lower values. Table II, showing the coefficients of variation of clothing expenditures for six types of families, illustrates the magnitude of such differences. Slightly lower values tend to be associated with family types having one, two or three children under 16 years of age. There is a tendency throughout for the expenditure of families consisting of husband and wife to be more variable.

The coefficients of variation for families of different types are of the same relative magnitude for small city, village, and farm families except for the one class, housing expenditures. For farm families such

TABLE II
COEFFICIENTS OF VARIATION OF EXPENDITURES FOR CLOTHING: PENNSYLVANIA AND OHIO FARM FAMILIES, 1935–1936

Income class	Families of husband, wife, and—					
	No others	One person under 16	Two persons under 16	Three persons under 16	One person over 16 and 1 or no other person	One person over 16, one person under 16 and 1 or 2 other persons
$ 250–$ 500	111	83	47	—	71	—
500– 750	64	54	66	43	68	69
750– 1000	59	53	40	39	53	43
1000– 1250	49	61	41	36	46	45
1250– 1500	48	51	44	31	50	53
1500– 1750	60	55	45	47	43	56
1750– 2000	60	31	42	38	55	45
2000– 2500	58	48	50	34	54	37
2500– 3000	44	53	57	46	55	55

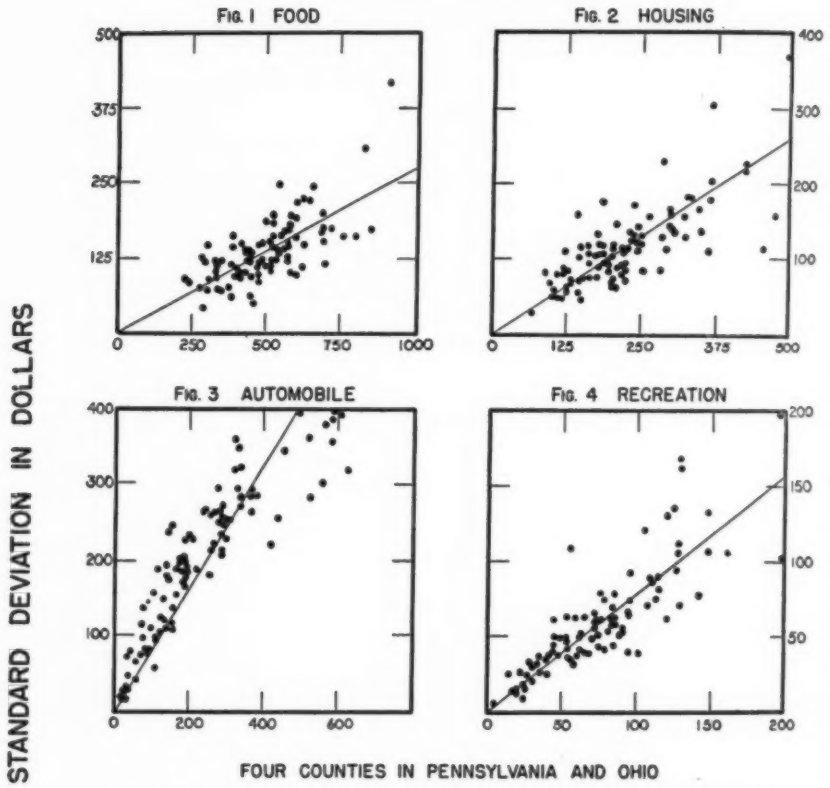
expenditures included only insurance, and repairs, while in the city and village, rent, interest on mortgage, and taxes were also included. The difference is thus a matter of non-comparable classifications. In general, the expenditures of farm group are more variable than are those of the corresponding city and village groups. Since money expenditures are dependent on money income, and since within any given income class farm families have a much higher proportion of non-money income than city or village families, the differences may be almost entirely ascribed to the greater variation in money income within the income class.

Averages and standard deviations were computed on the basis of all families in the class. In order to eliminate the effect of income for a selected number of expenditure groups, the expenditure of each family was expressed as a relative of the average for the income class. For

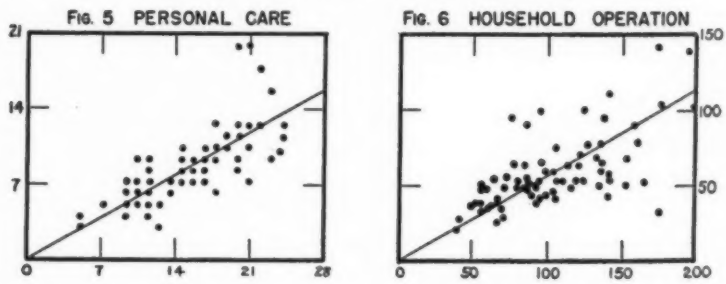
[3] For a discussion of the classification by family type, see Day Monroe, "Analysing Families by Composition Type with Respect to Consumption," this JOURNAL, 32 (1937), 35–39.

STANDARD DEVIATIONS OF FAMILY EXPENDITURES IN RELATION TO THEIR MEANS

FOUR SMALL CITIES IN OREGON AND WASHINGTON



FOUR COUNTIES IN PENNSYLVANIA AND OHIO



MEAN IN DOLLARS

many groups such as food and household operation all families in the class report expenditures. For other groups, such as automobile and tobacco, the number of families having no expense may include as many as half to two-thirds of the families. The distributions of these relatives are moderately asymmetrical in the case of food and clothing and J-shaped in the case of medical care, automobile and furnishings expense. The logarithmic normal curve is found to fit the distributions of total expenditures, food and clothing very well. When the zero expenditures are excluded from the distributions and the means calculated for families having an expense this curve also fits the distributions of medical care, automobile and furnishings expense, but somewhat less well than in the case of expenditures for food and clothing.

DISCRETE FREQUENCY DISTRIBUTIONS ARISING FROM MIXTURES OF SEVERAL SINGLE PROBABILITY VALUES*

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Many discrete frequency distributions may be considered as essentially binomial in type. The true binomial distribution is described by two parameters: "p" and "n". p is a probability ratio while n, the power of the binomial, corresponds to the size of the group upon which p acts. The relative frequency of "successes" due to p, from 0 to n, is given by

$$(1) \qquad q^n + npq^{n-1} + n(n-1)p^2q^{n-2}/2! + \cdots + p^n$$

where $q = 1 - p$. An example of a true binomial distribution is given by a series of results of tests on groups of animals in which they are subjected to some force of mortality, as is the case in protection tests. n here is fixed, being the number of animals in the test group; p corresponds to the mortality ratio.

The Poisson distribution may be regarded as a special case of the binomial. n and p are both unknown, but np is fixed. n is large (theoretically infinite) and p small, so that np is small, compared to n. The relative frequency of occurrence of successes is given by

$$(2) \qquad e^{-m}[1 + m + m^2/2! + m^3/3! + \cdots]$$

where $m = np$. In practice the Poisson distribution may be used to describe any series in which n is large and np (the mean) relatively small, so that the distribution is very "skew." A series of worm egg counts in fecal samples may serve as an example, the conceivable maximum count being much higher than the average of the actual numbers.

In a recent paper [1] use was made of certain moment functions of a binomial distribution, denoted by ϕ_n, for the separation of two mortality values in a series of mouse-protection test results. The present paper is devoted to the generalization and systematization of these functions and to examples illustrating their uses.

The first five ϕ functions of a binomial are defined as:

$$(3) \qquad \begin{aligned} \phi_1 &= \nu_1/n \\ \phi_2 &= (\nu_2 - \nu_1)/(n)\ (n-1) \\ \phi_3 &= (\nu_3 - 3\nu_2 + 2\nu_1)/(n)\ (n-1)\ (n-2) \\ \phi_4 &= (\nu_4 - 6\nu_3 + 11\nu_2 - 6\nu_1)/(n) \cdots (n-3) \\ \phi_5 &= (\nu_5 - 10\nu_4 + 35\nu_3 - 50\nu_2 + 24\nu_1)/(n) \cdots (n-4) \end{aligned}$$

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 28, 1937.

where ν_i is the ith moment about zero of the distribution. The coefficients in the numerator follow those of the expansion of $n(n-1)\ (n-2)\ \ldots$ in the denominator. In a simple binomial, each ϕ equals the corresponding power of p. That is, $\phi_1 = p,\ \phi_2 = p^2, \cdots, \phi_n = p^n$.

Now suppose that a given binomial distribution is made up of different proportions $U, V, W, \cdots Z$, so that $U+V+W+\cdots+Z=1$. Assume that each fraction of the total arises from an independent value of p: $p_u, p_v, p_w, \cdots, p_z$. Then each ϕ is made up of corresponding proportions of the respective powers of the p's:

$$
\begin{aligned}
(4) \qquad \phi_0 &= 1 = U + V + W + \cdots + Z \\
\phi_1 &= Up_u + Vp_v + Wp_w + \cdots + Zp_z \\
\phi_2 &= Up_u^2 + Vp_v^2 + Wp_w^2 + \cdots + Zp_z^2 \\
\phi_n &= Up_u^n + Vp_v^n + Wp_w^n + \cdots + Zp_z^n.
\end{aligned}
$$

In order to solve for the values of $U, V, \ldots$ and $p_u, p_v, \ldots$ it is necessary only to calculate a sufficient number of ϕ functions (one for each unknown) and to solve the resulting equations. There are, of course, practical limits: higher moments are untrustworthy in small series, the equations become very complicated as the number of unknowns increases and the power of the binomial must be at least as great as the number of functions to be calculated. Within limits, the procedure is simple and straightforward.

The ϕ functions also correspond to the respective moments about zero (ν's) of the curve

$$y = kp^t(1-p)^t$$

when the latter is the generating function of a "chain binomial," whose characteristics have been previously outlined [1].

Now we can define another series of moment functions as:

$$
\begin{aligned}
(5) \qquad \Psi_1 &= \nu_1 \\
\Psi_2 &= \nu_2 - \nu_1 \\
\Psi_3 &= \nu_3 - 3\nu_2 + 2\nu_1 \\
\Psi_4 &= \nu_4 - 6\nu_3 + 11\nu_2 - 6\nu_1 \\
\Psi_5 &= \nu_5 - 10\nu_4 + 35\nu_3 - 50\nu_2 + 24\nu_1
\end{aligned}
$$

corresponding exactly with the respective ϕ functions except for division by $(n)\ (n-1)\ldots$. It is found that a Ψ function derived from a Poisson distribution equals the corresponding power of the value of $m(=np)$ generating the distribution. If, then, we can assume that a given distribution is made up of a number of independent Poisson distributions, whose proportion of the total is expressed by $U, V, W, \cdots Z$, and whose m values are $m_u, m_v, m_w, \cdots m_z$, we may set up a series of equations analogous to those of (4):

(6)
$$\Psi_0 = 1 = U + V + W + \cdots + Z$$
$$\Psi_1 = Um_u + Vm_v + Wm_w + \cdots + Zm_z$$
$$\cdots$$
$$\Psi_n = Um_u^n + Vm_v^n + Wm_w^n + \cdots + Zm_z^n$$

Therefore, any set of equations developed for the solution for values of $U, V, \cdots$ and $p_u, p_v, \cdots$ may be used to solve for $U, V, \cdots$ and $m_u, m_v, \cdots$ by substituting Ψ functions for ϕ functions, and vice versa.

Likewise, the Ψ functions correspond to respective moments about zero (ν's) of the curve

$$y = kx^r e^{-ax}$$

when the latter is the generating function of a "chain Poisson" [2]. The moments of this function are:

(7)
$$\nu_1 = (r + 1)/a$$
$$\nu_2 = (r + 1)(r + 2)/a^2 \quad \text{etc.}$$

and the solution for parameters is given by:

(7a)
$$a = \Psi_1/(\Psi_2 - \Psi_1^2)$$
$$r = a\Psi_1 - 1$$
$$k = a^{r+1}/r! \text{ where } \Sigma y \text{ is put equal to } r \text{ and } r! = \Gamma(r + 1)$$

In this notation, the elements of the chain Poisson series are expressed by:

$$\left[\frac{a}{a+1}\right]^{r+1}\left[1 + \frac{r+1}{a+1} + \frac{(r+1)\ (r+2)}{2!(a+1)^2} + \frac{(r+1)\cdots(r+3)}{3!(a+1)^3} + \cdots\right].$$

A given binomial (or Poisson) distribution may therefore be considered as falling within one of the following types:

(1) It arises from a single probability value, and
$$\phi_1^n = \phi_2^{n/2} = \phi_3^{n/3} = \cdots = \phi_n$$
(2) It is a mixture comprised of several components, each generated by a single value.
(3) It arises from a continuous distribution of probability values.

In general, in the two latter cases,

$$\phi_1^n < \phi_2^{n/2} < \cdots < \phi_n$$

In addition, it is possible to conceive of series arising from mixtures of single and continuous probability values. Such mixtures are apparently encountered in the case of protection test results including both negative and positive sera. So far, it has been necessary to handle them by various methods of approximation.

At present there are no criteria which lead to the direct determination of the type of distribution. It seems reasonable to consider, however, that the assumption producing a good "fit" of the observed data presents a fairly good picture of the forces which have produced the distribution in question.

Example A

Table 1 presents the results of a series of single-slide counts of eggs of *S. mansoni*, performed in a village in Egypt by Dr. J. Allen Scott.

TABLE 1
FREQUENCIES OF COUNTS OF EGGS OF *S. mansoni* ON SINGLE SLIDES
(Data of Dr. J. A. Scott)

(1) Number of eggs	(2) Observed frequency	(3) Simple Poisson	(4) Chain Poisson	(5) Zero plus chain Poisson	(6) Zero plus two simple Poissons
0	603	373.8	579.3	297*	555*
				297.3	53.9
1	112	339.1	158.2	137.2	100.3
2	93	153.8	76.9	76.6	93.4
3	53	46.5	42.8	45.2	58.3
4	19	10.5	25.4	27.4	28.6
5	21	1.9	15.6	16.9	12.7
6	7	0.3	9.8	10.5	6.5
7	6	0.0	6.2	6.6	4.5
8	5	0.0	4.0	4.1	3.8
9	2	0.0	3.0	2.6	3.1
10	1	0.0	1.9	1.7	2.4
11	2	↑	↑	↑	1.7
12	0				↑
13	0	0.0	2.9	3.0	2.4
14	2				
15	0	↓	↓	↓	↓
Total	926	926	926	926	926
Chi square			26.0	15.4	12.8
n			9	8	8
P			0.002	0.05	0.1

* Calculated "Zero" or uninfected component.

Each slide represents one inhabitant. It is evident that the distribution follows the general type of the Poisson. The moment functions here are:

$$\nu_1 = 0.907\ 127 \qquad \Psi_1 = 0.907\ 127$$
$$\nu_2 = 3.835\ 85 \qquad \Psi_2 = 2.928\ 73$$
$$\nu_3 = 24.693\ 3 \qquad \Psi_3 = 14.991\ 0$$
$$\nu_4 = 212.825 \qquad \Psi_4 = 101.421$$

Clearly the scatter is much greater than that attributable to a single distribution. Column 3 of table 1 shows the frequencies calculated on the basis of a simple Poisson distribution of $m=0.907$; the deviation from the observed data is very large.

The assumption is next made that the distribution of counts may be explained by a continuous distribution of severities of infection, described by a probability curve. Solving for the constants of the curve by the equations of (7a) we obtain as the generating function:

$$y = kx^{-0.6092}e^{-0.4308x}$$

which gives the calculated results of column 4, table 1. These are in better agreement, but the fit is still not good. On Chi-square test, $P=0.002$.

The assumption of neither class of distribution appears to hold. In fact we should, a priori, expect the series of egg counts to embody a sample of two populations: one non-infected and the other infected, probably in varying degrees. Slides showing no eggs would therefore fall into two groups: those from individuals harboring no worms and those from individuals whose egg counts were so low that the particular slides happened to be negative.

To make the simplest assumption, we say that there is one uninfected component (U) with no eggs ($m_u=0$) and a positive one (V) which can be described by a simple Poisson (m_v). The normal equations become:

(8)
$$\begin{aligned} \Psi_0 &= U + V = 1 \\ \Psi_1 &= Vm_v \\ \Psi_2 &= Vm_v^2 \end{aligned}$$

and the equations for solution are:

(8a) $\quad m_v = \Psi_2/\Psi_1 \qquad V = \Psi_1^2/\Psi_2 \qquad U = 1 - V.$

In this particular case, the result is a negative component including 666 slides and a positive of 260 slides following a Poisson with $m=3.2286$. The fit is bad, as might be expected.

It would seem more logical to assume that the positive fraction might be a chain Poisson arising from a continuous distribution of severities of infection. On this hypothesis, the normal equations are, in accord with the equations of (7):

(9)
$$\begin{aligned} \Psi_0 &= U + V = 1 \\ \Psi_1 &= V(r+1)/a \\ \Psi_2 &= V(r+1)\,(r+2)/a^2 \\ \Psi_3 &= V(r+1)\,(r+2)\,(r+3)/a^3 \end{aligned}$$

and the equations for solution are:

(9a)
$$a = \Psi_1\Psi_2/(\Psi_1\Psi_3 - \Psi_2^2)$$
$$r = (\Psi_2 a/\Psi_1) - 2$$
$$V = \Psi_1 a/(r+1) \qquad U = 1 - V.$$

The results are shown in column 5 of table 1. In this case, 297 slides are estimated as truly negative, while 629 positive slides are distributed in accord with the curve

$$y = kx^{-0.2946}e^{-0.5283x}$$

The fit is better, but not very good.

In addition to the series of one-slide counts, a series of total counts of three slides was available for the same individuals. From this wider spread it seemed apparent that there were at least two distinct distributions of positive individuals at different levels of infection. If the one-slide counts can be described on an assumption of a negative component (U) and of two different simple Poissons (V, m_v and W, m_w) the normal equations are:

(10)
$$\Psi_0 = U + V + W = 1$$
$$\Psi_1 = Vm_v + Wm_w$$
$$\Psi_2 = Vm_v^2 + Wm_w^2$$
$$\Psi_3 = Vm_v^3 + Wm_w^3$$
$$\Psi_4 = Vm_v^4 + Wm_w^4$$

and the equations for solution are:

(10a) $$m^2(\Psi_1\Psi_3 - \Psi_2^2) + m(\Psi_2\Psi_3 - \Psi_1\Psi_4) + (\Psi_2\Psi_4 - \Psi_3^2) = 0$$

(where the roots of the equation are equal to m_v and m_w, respectively)

$$W = (\Psi_2 - \Psi_1 m_v)/m_w(m_w - m_v)$$
$$V = (\Psi_1 - Wm_w)/m_v$$
$$U = 1 - V - W$$

The results of the calculations are given in column 6, table 1. The fit is the best, so far. The hypothetical distributions are:

555 actually negative individuals
346 lightly infected ($m = 1.8606$)
26 heavily infected ($m = 7.6965$)

where m is the mean number of eggs per slide. As a matter of fact, the same procedure applied to the three-slide count series yields the following distribution (when the means are reduced to the basis of single slides):

558 actually negative
351 lightly infected ($m = 2.3206$)
17 heavily infected ($m = 8.9854$)

These figures, being based on larger fecal samples may be assumed to be more nearly accurate. As might be expected, the observed frequencies indicate a wider scatter than is provided by two simple Poisson distributions. It is evident, however, that the analysis of single-slide counts gives essentially the same picture of infection in this population as do the data for examinations involving some three times the time and effort. This description of infection severity, whatever its shortcomings, does provide constants useful in the comparison of different population groups.

The foregoing example illustrates the general approach to a specific problem, using Ψ functions of a Poisson. Mixed binomial distributions can, of course, be handled by the same equations if ϕ functions are substituted.

Example B

It sometimes happens that binomials of different powers must be considered in one analysis. If there are considerable frequencies in each of a few powers, the best method would probably be to use weighted means of the ϕ functions of each. This would be the case in standard six-animal protection tests, where a considerable number of readings on the basis of five and of four animals has accumulated owing to accidental early deaths of one or two of the group.

On occasion, the binomial powers are scattered over a wide range with a few cases of each. Here ϕ functions may be built up from the individual groups. Let us say that the number dying in a series of n mouse families is represented by $d_1, d_2, d_3, \cdots d_n$, in families of $f_1, f_2, f_3, \cdots f_n$; let $\Sigma f_i = N =$ the total of all mice. Then the weighted value for ϕ_1 will be

$$\Sigma(f_i d_i/f_i)/N = \Sigma(d_i)/N \tag{11}$$

Likewise, the weighted ϕ_2 is

$$\Sigma[f_i(d_i^2 - d_i)/f_i(f_i - 1)]/N = \Sigma[d_i(d_i - 1)/(f_i - 1)]/N \tag{11a}$$

and ϕ_3 is

$$\begin{aligned}&\Sigma[f_i(d_i^3 - 3d_i^2 + 2d_i)/f_i(f_i - 1)(f_i - 2)]/N \\ &= \Sigma[d_i(d_i - 1)(d_i - 2)/(f_i - 1)(f_i - 2]/N\end{aligned} \tag{11b}$$

This type of problem was presented by data obtained by Dr. T. P. Hughes while attempting to isolate strains of mice susceptible and

resistant to inoculation with yellow fever virus. Each litter was treated as a binomial; the litters analyzed ranged in size from 2 to 15.

Weighted ϕ functions were calculated for three groups of litters: (1) An original unselected group; (2) the first filial generation of families selected as susceptible; (3) another filial generation selected as resistant. Litters of two could obviously not be included in the computation of ϕ_3, but were included in the lower functions. Analysis was made on the assumption of a mixture of two simple binomials, whose solution has already been published [1]. The results of the analysis are given in table 2.

TABLE 2

ANALYSIS OF MORTALITY OF MOUSE LITTERS: TWO SIMPLE BINOMIALS
(Data of Dr. T. P. Hughes)

Group	ϕ_1	ϕ_2	ϕ_3	U	p_u	V	p_v
(1) Unselected	0.5175	0.3008	0.1946	0.745	0.394	0.255	0.784
(2) Filial (susceptible)	.8000	.6740	.5863	.245	.482	.755	.903
(3) Filial (resistant)	.3824	.1613	.0809	.951	.355	.049	.921

The largest group included only some 60 litters, so that the derived constants cannot be considered very accurate. At the same time, some conclusions may be drawn:

(1) The original population consisted of families of which about three-quarters showed a low mortality rate(about 40 per cent) and the rest a much higher one (about 80 per cent).

(2) The first filial generation, selected from presumably susceptible stock, reversed the proportions without showing much change in the basic mortality rates.

(3) The first "resistant" filial generation retained comparable mortalities but the proportion showing high mortality decreased to about one-twentieth.

Continuation of this analysis over relatively few subgenerations, with sufficient data, should clearly indicate whether these two mortalities could or could not be further modified by additional breeding. There may be other similar applications of the method in genetic studies.

Uses of the Ψ functions have included descriptions of the distribution of counts of branches of larval hairs in races of anophelines, leading to tabulations of probability of identification with any given count. These analyses have involved chain Poisson series beginning at values greater than zero and arising from generating functions with negative second moments $[\Psi_1^2 > \Psi_2]$. There is no opportunity to discuss these functions at this time.

The method outlined in this paper appears to have value in the analysis of discrete frequency distributions. By its use, the following questions may be answered:

(1) Is a given distribution simple or complex?

(2) If the latter, what [within limits] is a good description of the factors generating the distribution?

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COMPARABILITY OF MORTALITY STATISTICS*

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One of the primary objectives in the compilation of mortality statistics is the presentation of an accurate picture of mortality conditions. This involves the past as well as the present, for it is only in the light of history that we can judge our success or failure, our progress or decline. Although innumerable efforts have been made to bring mortality statistics to the state of perfection where they will serve as adequate criteria for evaluating the progress of general health conditions, there still remains a great deal to be done before this goal has been reached. Numerous factors remain to be evaluated and controlled especially in the study of mortality from specific diseases, for the diagnostic interpretation of conditions causing death partakes of a dynamic character, depending as it does upon the continually expanding knowledge of the medical profession.

CHANGES IN THE INTERNATIONAL LIST OF CAUSES OF DEATH

One of the most important of these factors is the evolutionary character of the International List of Causes of Death. Since its adoption as an international classification system in 1900, it has undergone four revisions and will soon undergo the fifth in preparation for the 1940–1950 decade. These revisions constitute an outstanding example of international cooperation in statistical work as they provide the means of keeping the classification of causes of death in harmony with developments in the science of medicine.

Unfortunately, these decennial revisions disturb the continuity of time series based on mortality from specific diseases, as terms have occasionally been transferred from one rubric to another. Such changes are necessary, of course, to properly reflect the changing attitude of physicians and statisticians toward the various diseases and conditions which contribute to mortality. Persons interested in time trends, however, point out that these changes should have been evaluated to provide a means whereby correction factors could be applied to make the statistics continuous from one decade to the next. To obviate this criticism in the future, the Bureau of the Census plans to classify all deaths occurring in 1940 according to the present as well as according to the new form of the International List. Thus, the means will be provided for adjusting the mortality rates on specific causes between the present and the coming decennial period.

* Condensed from a manuscript read at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 29, 1937.

SELECTION OF THE PRIMARY CAUSE OF DEATH

Practically all published mortality statistics are based on the principle that each death can be represented by a single cause. If all death certificates recorded but one fatal condition this principle would stand without question, and the International List would in itself suffice for classification purposes. However, a large proportion of death certificates contain more than one cause, thereby necessitating the use of some definite method for selection of the cause under which the death is to be tabulated.

In 1935 the Bureau of the Census undertook a study of the differences among various countries in selection of the primary cause of death. A list of 1,032 deaths, each showing two or more causes, was sent to forty-one countries. These cases were selected as representative of coding problems rather than as a random sample of death certificates; therefore, the returns must be interpreted qualitatively rather than quantitatively. Of the eighteen replies received, eleven (including the United States) were from countries using the detailed form of the International List for 1929. Preliminary study of the returns from these eleven countries indicates a marked variation in assignments. (See the accompanying table.)

PERCENTAGE OF AGREEMENT WITH THE UNITED STATES AND WITH ENGLAND AND WALES IN SELECTION OF PRIMARY CAUSE OF DEATH

Nation	Total deaths		Infant deaths		Puerperal deaths		Tuberculosis deaths		Cancer deaths	
	U.S.	E.W.	U.S.	E.W.	U.S.	E.W.	U.S.	E.W.	U.S.	E.W.
United States	—	62	—	50	—	53	—	72	—	98
England and Wales	62	—	50	—	53	—	72	—	98	—
Australia	85	65	89	48	80	60	95	72	94	95
Canada	61	72	58	73	76	68	89	65	88	90
Ceylon	89	65	89	53	84	44	97	74	95	93
Holland	56	63	59	56	64	58	49	50	86	88
Italy	58	61	62	59	63	56	74	68	83	90
New Zealand	81	64	81	49	77	37	87	77	98	97
Philippine Islands	83	64	80	53	79	56	87	75	93	93
Scotland	60	59	48	59	63	60	65	81	94	93
Union of South Africa	50	65	56	63	62	76	57	79	87	95
Average	68.5	64.0	67.2	56.3	70.1	56.8	77.2	71.3	91.6	93.2
Number of cases	1,032		89		70		54		66	

For all of the 1,032 cases the relative agreement of each of the ten countries with the United States ranges from 50 per cent to 89 per cent, the average being 68.5 per cent. In the case of the 89 infant deaths included in the list, the agreement is slightly lower. Agreement for the 70 puerperal deaths is higher, the average being 70.1 per cent. For the

tuberculosis deaths the average rises to 77.2 per cent and for cancer it is 91.6 per cent. Comparison of these countries with England-Wales shows that the average agreement is lower than with the United States except for deaths due to cancer. It is not claimed that the differences resulting from various systems of selecting the primary cause of death are accurately measured by this study, but it is evident that comparison of statistics on specific causes of death among the nations represented in this study may lead to erroneous conclusions even though these statistics are based on the International List.

The following alternatives suggest themselves for the removal of the discrepancies arising from the use of different systems of selecting the primary cause of death: (1) that nations now agreeing in the use of the International Nomenclature extend that agreement to a uniform system of selecting primary causes of death for tabulation, or (2) that studies be made upon an international basis for evaluating quantitatively the effect of these differences. To indicate the proportion of death certificates actually involved in such selection, tabulations showing the relation between primary and contributory causes of death are now being made by the following countries which are to be represented at the International Conference: Australia, Canada, Denmark, England, Germany, Greece, New Zealand, Panama Canal Zone, Scotland, Switzerland, and Turkey. These tabulations should prove invaluable in demonstrating the importance of the whole question of primary cause selection. As its contribution, the United States will submit multiple cause tabulations for all deaths that occurred in the United States during 1936, together with special studies on international coding practices.

ACCURACY OF CAUSE OF DEATH REPORTING

Another factor, less tangible, less definable, but really more fundamental, is the accuracy with which causes of death are reported on death certificates. Although not so commonly recognized as an important factor, because of its remoteness from the final results, it nevertheless constitutes one of the most important problems in the field of mortality statistics. This is shown by a study[1] carried on in Westchester County, New York, during 1933, on the reporting of deaths from syphilis and alcoholism, in which it was found that mortality from these two causes was more than 50 per cent underreported. To what degree this holds true in other localities and for other diseases is not known. One way in which to establish a partial check of this particular problem is to determine the accuracy of cause of death state-

[1] "Effect of a Confidential Inquiry on the Recorded Mortality from Syphilis and Alcoholism," M. Nicoll, Jr., M.D., and M. T. Bellows, *American Journal of Public Health*, Vol. 24, No. 8, Aug., 1934, pp. 813–820.

ments on death certificates by comparing them with autopsy records. More studies of this nature are required before results will be obtained which can be used to measure present mortality returns with any degree of certainty.

It has been suggested that a certificate on which the cause of death is strictly confidential would solve this problem. Switzerland and Holland have been using such a certificate for some time, but to our knowledge have not analyzed the effect of confidential reporting on their mortality statistics. No real trial has been made of the suggestion in this country, although in one of our large cities efforts are being made to do so. It appears, therefore, that there is little factual evidence at hand demonstrating the degree to which cause of death statistics might be improved by means of a confidential reporting system.

TERMINOLOGY

Closely allied to the question of accuracy in the reporting of causes of death is the terminology used by the doctors and coroners who are responsible for information on death certificates. In spite of the fact that the cause of death is one of the most important basic factors in mortality statistics, many of the certificates filed do not contain this information in satisfactory form. Terms indicating only symptoms or minor associated conditions are frequently reported and operative terms, patently recognized as nonfatal, are very often used. Prior to 1935 the Bureau of the Census returned thousands of such records to the reporting physicians each year, in many cases nine to twelve months after the death occurred. This function has now been taken over by practically all State health offices with a noticeable improvement in the speed with which returns are obtained. However, the use of a completely satisfactory cause of death terminology can hardly be developed among the physicians of this country until they have been imbued with a fuller realization of the meaning of mortality statistics. This realization can best be brought about by education, preferably by the introduction of intensive courses on vital statistics in our medical schools and colleges. Until then the nomenclature upon which mortality statistics are based must continue to retain many terms that are not acceptable.

FORM OF CAUSE OF DEATH QUESTION ON DEATH CERTIFICATE

Underlying the accuracy and completeness with which causes of death are reported on the death certificate is the form in which the cause of death question is asked. On first thought this may seem a simple matter, but the experiences of various countries which have studied the problem, prove that the opposite is true.

For instance, the present English certificate requires the reporting physician to give first the "Immediate cause of death," next "Morbid conditions, if any, giving rise to the immediate cause," and last "Other morbid conditions." After considerable experimentation the English authorities concluded that this form of question elicited results sufficiently accurate in most cases to permit classification directly, i.e., on the basis of the doctor's statement.

In contrast, the certificate used in the United States requires the doctor to report first the "Principal cause of death and related causes of importance," and second "Other contributory causes of importance," with dates of onset whenever possible. This form of question has not been satisfactory in eliciting the proper sequence of morbid conditions. Consequently, an arbitrary system of selecting the primary cause for tabulation was developed, namely, the *Manual of Joint Causes of Death*.

A considerable demand has arisen for revision of the present American certificate. In order to obtain a broad clearance of this question, the Bureau of the Census during the latter part of 1937 mailed over 6,000 questionnaires to individuals and organizations interested in vital statistics. With regard to the questions on cause of death, an opinion was asked as to the advisability of adding the following item for the doctor's attention, "To which cause should death be assigned?" The physicians' answers could then be tabulated and compared with the statistics resulting from the method of selecting the primary cause of death by the use of the *Joint Cause Manual*. By this expedient, it would be possible to determine the relative agreement or disagreement between the opinion of the medical profession and the arbitrary selection of the primary cause of death by the use of the *Joint Cause Manual*.

CONCLUSION

Now that the *International List of Causes of Death* has been quite generally adopted as a standard basis of nosological classification, it is necessary to press forward toward the solution of other elements in the problem of making mortality statistics truly comparable. Underreporting of certain types of disease conditions should be studied and corrected if possible. Terminology used in the reporting of causes of death should be standardized, especially in its interpretation for statistical purposes. The manner in which the reporting physician is requested to supply information should be brought into alignment with modern practice. Above all, the method of selecting the cause under which the death is to be tabulated should be standardized among the various agencies engaged in the compilation of vital statistics.

NOTES

THE ASSOCIATION OF AGRICULTURAL PRICE FLUCTUATIONS

The general equilibrium theory regards a price as functionally related to all other prices. Some of the connections are simple and direct; for example, one commodity may be a substitute for another or be an important raw material utilized in its production. Other relationships may be more remote or the connections may be even so attenuated as to have little real meaning. It should be possible to begin with a single price and starting with closely associated prices trace the varying degrees of relationship out to groups of relatively unrelated prices, in short to lay out a pattern of the position of this price in the system of prices. Knowledge of these relationships is of importance in understanding the connections of prices and as a preliminary step in the study of the transmissions of influence through the price system. This note presents an exploratory study of an important group of agricultural prices.

The prices included in the study are the average farm prices reported for the United States by the Department of Agriculture on December 1 of each year, except butter and eggs which are yearly averages of wholesale market prices. Thirteen commodities have been compared for the period 1910 to 1936. Each individual price has been reduced first to a price relative using as a base the average price for that commodity over the entire period. The ratio of the price relatives of the two commodities to be compared then has been computed for each year of the series. This gives the relative prices of the quantities of the respective commodities which have averaged a dollar in price over the entire period. When the prices of two commodities have about the same relative changes throughout the period and are positively correlated in their movements the ratios do not differ greatly from 100, but when the prices do not have similar fluctuations or are negatively correlated in their movements the ratios may vary greatly. The variation in these ratios may thus be taken as a measure of the association in the price movements, a small variation indicating a high positive association and a large variation a lack of association or a negative association. Our interest here is in the positive association and, in consequence, the small variation. A part of the change in these ratios may be due to trends in the prices of the commodities. Over such a long period of time gradual and considerable changes in demand and productive technique may take place. Since we are concerned only with the association of prices in the shorter periods, the ratios have been re-

duced to logarithms and a trend fitted by the method of least squares. The deviations from this trend have been computed and their standard deviation found. This has been taken as a measure of the similarity of the price movements of the compared commodities. For convenience, the logarithmic values of these standard deviations have been reduced to numbers, and serve as an index of the closeness of relationship. If two prices had the same relative fluctuation throughout the period, except for the trend of their relationships, the standard deviation of their price ratios would have been zero. Where the standard deviation is large, prices have had dissimilar movements. The values of these indexes are given in the accompanying table.

TABLE 1

STANDARD DEVIATIONS OF RATIOS OF PRICE RELATIVES OF VARIOUS AGRICULTURAL PRODUCTS, 1910 TO 1936

	Corn	Oats	Rye	Barley	Flax	Cotton	Potatoes	Hogs	Cattle	Sheep	Eggs	Butterfat
Wheat	22	21	15	24	23	38	36	26	38	25	32	31
Corn		14	21	19	28	40	49	32	38	33	43	36
Oats			17	12	24	42	45	35	36	35	36	31
Rye				19	27	44	43	36	40	32	35	36
Barley					26	45	52	39	44	41	41	37
Flax						33	39	33	38	29	32	30
Cotton							57	45	54	34	43	39
Potatoes								38	45	42	39	42
Hogs									33	22	32	24
Cattle-calves										31	35	27
Sheep-lamb											32	27
Eggs												18

As would be expected the closest group of price relationships is found among the feed grains, oats, corn, barley, and rye for all of which the values of the index are below 22. Only three other relationships have values this low and these are wheat-rye, eggs-butterfat, and oats-wheat. The livestock prices, cattle, hogs, sheep, and butterfat form a second group somewhat less closely related than the feed grains, but nevertheless with all the indexes lying between 22 and 33. The relationships between livestock and feed prices are less close than those among the livestock themselves or the feed grains themselves. The livestock-feed price indexes lie between 31 and 44, the closest being oats-butterfat at 31 and corn-hogs at 32. Cotton and potatoes are unrelated to the other groups or to each other, the highest index of 57 occurring between them. The lowest values found for cotton were with flax, 33, and sheep, 34. The lowest value for potatoes was 36 with

wheat. In general the relationship between the prices of the cash crops of wheat and flax and livestock were closer than between the prices of feed crops and livestock. Eggs were less closely related in price to the other products than butterfat, even though the relationship between the prices of eggs and butterfat was close. When the indexes are arranged in a frequency the range is from 12 for oats-barley to 57 for cotton-potatoes, and the median value is 35. The relationships between the feed prices and between the livestock prices lie below the median. The feed grain-livestock relationships begin close to the median and are mostly above. The relationships between cotton, potatoes, and eggs and the other products are almost all above the median.

The results support the preliminary hypothesis and are suggestive for further analysis. A wide range in price association is disclosed with groupings of commodities at different points for particular sorts of relationships. Extension of this type of analysis over a wider range of commodities would provide a better factual background for the equilibrium theorist in his study of the price structure in operation. It is also significant for problems of price analysis in showing what prices are sufficiently isolated to be subject to individual attack and which are so completely interwoven with others to be best subject to a group analysis. Finally, there are indications of the route by which specific changes may be transmitted through the price system.

WARREN C. WAITE

University of Minnesota

BIG BUSINESS, ITS GROWTH AND ITS PLACE

In the December number of this JOURNAL there appeared a review by Mr. Gardiner C. Means of the Twentieth Century Fund book, *Big Business, Its Growth and Its Place*, of which we were principal authors. This review appears to us to be so unfair that, in justice to ourselves and the organization under whose auspices the study was conducted, we think necessary a letter of protest.

In the first place the discussion of the rise of large corporations is not, as Mr. Means said, "devoted almost solely to summarizing two well-known studies of industrial mergers." Citations were made not only from Thorp and Watkins but also from Berle, Davis, Gerstenberg, Seager and Gulick, Moody, and the Census. In addition to that Mr. Means has read the original manuscript of which this book is a partial summary and therefore must have known that the history of over 300 large corporations was traced back from their own reports in order to ascertain the date when they were formed and that exhaustive studies were made of their assets and profits since 1900.

Mr. Means stated that there was no indication given as to how the figures representing the percentage of the national income produced by corporations

were arrived at. But on page 15 of the book there is a table showing the method used for manufacturing and for mining, and the sources are cited in the footnote on page 17. Here again Mr. Means has seen the original manuscript and must therefore have known the method used. It is necessarily rough, but we have heard of no better method. Very likely the method we used exaggerates the importance of corporations because the Census omits the smallest units, which are usually not incorporated.

Mr. Means's criticism of the discussion of the proportion of assets owned by large corporations is apparently based on the assumption that *assets owned* should be interpreted to mean *property controlled*. The difference between the two concepts is referred to several times in the book, especially in the very last paragraph of the conclusions. The income tax statistics do not show as consolidations all of the corporations that might properly be termed such. They do, however, show for each controlling company the value of its holdings in other corporations, and that is the proper figure to use when talking of assets owned.

Similarly with reference to the income received by parent companies, all dividends and fees received from subsidiaries are included in the parent companies' reported net income. Consequently the underestimate of income of consolidations would consist only in the amount of income earned by subsidiaries that was not distributed. It would not even equal the whole of that, because the minority interests would be entitled to part of it. In 1933 there is every reason to suppose that the amount of income earned by subsidiaries that was not distributed was very small, since the parent companies needed the money. Consequently if there is any underestimate of the proportion of income received by large corporations it is probably very slight.

Mr. Means's theoretical argument concerning integration is sound, but it is largely offset by three facts. One is that if integration causes the compiled receipts of large corporations to appear smaller than they otherwise would, it is equally true that the figure for total compiled receipts of all corporations is also too small. Consequently one partly offsets the other. Another offset is that the relation of gross sales of large corporations to those of all corporations was slightly less in those industries where gross sales were reported than the ratio of total receipts. The ratio of gross sales less cost of goods sold was also less than the ratio of total receipts. By using figures for total receipts instead of gross sales, part of the theoretical underestimate has been allowed for. No other figures exist that can be used to ascertain the relative importance of large corporations and small corporations in each industry. The third offset is that vertical integration which might cause an under estimate of the importance of large corporations is important only in manufacturing, mining, and trade but not in public utilities and transportation where giant corporations are most common.

Mr. Means postulates a figure of 32.3 per cent which he says was used to apportion the national income produced by corporations. In a footnote he admits that the figure 32.3 per cent is not presented directly in the report.

As a matter of fact such a figure was not used at all. Each industry was studied separately in the light of the best figures available.

It is hard to understand how Mr. Means can insist that governments should be regarded as large corporations, in view of the fact that the present agitation against large corporations is based mainly on the fact that they are privately controlled, and the most popular remedies proposed involve having the Government take over some of the functions of large corporations. This book was a study of big business. It is certainly inconsistent with common usage to regard governments as being in the class of big business. They may or may not be legally incorporated, but they are presumably not run for the profit motive, they declare no dividends, and in the election of their directors and officials the number of votes case by each voter is not based on the amount of his investment.

As for the accusation of bias, the reader will have to reach his own conclusions on the basis of his knowledge of the reputation of the Twentieth Century Fund, which sponsored the study, of the personnel of the Committee, which supervised the project, and of the research and editorial staff, which was directly responsible for the study. If the findings presented by the staff in an honest effort to discover the facts are not in conformity with Mr. Means's convictions, it is just possible that the fault lies with Mr. Means and not with the report.

RUFUS S. TUCKER
ALFRED L. BERNHEIM
MARGARET GRANT SCHNEIDER

The Twentieth Century Fund
New York City

In the effort to show unfairness in the review of *Big Business, Its Growth and Its Place*, Mr. Tucker and his associates deal with five questions of fact and two questions of opinion.

On four of the five questions of fact they would appear to have taken untenable ground.

1. They name six works in addition to those referred to in the review which they claim are cited in the discussion of "the rise of large corporations." Actually only two, Moody and the Census, are cited with respect to *large* corporations, less than a full paragraph being devoted to each. Berle, Davis, Gerstenberg, and Seager and Gulick are cited only in reference to the "growth and extent of incorporation." This leaves the discussion of the rise of *large* corporations "devoted almost solely to summarizing the two well-known studies of industrial mergers" (Thorpe and Watkins), as stated in the review. It is not clear just what relevance material in an unpublished manuscript has to a criticism of paucity of content of the book actually published.

2. They claim that the methods employed in arriving at two of the 10 figures in the table on page 17 which represent the percentage of national income produced by corporations were given in a table and footnotes of a

preceding page. Actually, the figures in the two tables are different, are listed under different captions, and no reference is anywhere made to indicate a connection. One is left to rely on the footnote: "Sufficient space is not available to explain the methods used to arrive at the estimates of the percentage of income produced by corporations." If an indication had been given that the "value of product" was used in estimating the percentage of "income produced," the reviewer would have criticized the application of this method to manufacturing when equally reliable figures on "value added" are available.

3. The authors draw a quite appropriate distinction between assets owned and property controlled, claim that this distinction has been referred to in the book and suggest that the reviewer erred in assuming that the Twentieth Century Fund report was primarily concerned with property or assets controlled. Actually the above distinction is neither discussed nor maintained in the book. In the same or consecutive pages the assets of the same group of corporations are referred to as assets owned and assets controlled (pages 5 and 6; page 67). The only figures given and referred to as "assets owned" are derived from partially consolidated income tax returns and therefore include some assets controlled as well as "assets owned." The whole thrust of the book in so far as it is concerned with wealth is around the concept of "assets controlled." The chapter on the "Concentration of Corporate Wealth," which starts off with the question "What proportion of business assets of the nation do the large corporations *own?*" (page 54); goes on to give only figures of assets derived from consolidated income tax returns, which include a large body of assets controlled but not owned by the parent companies; indicates that the concentration of wealth "is to some degree understated because certain corporations controlled by others are separately reported" (page 56); and ends up exemplifying the statement that "the giants control a slightly larger percentage of capital assets than they do of total assets," by citing figures referred to as dealing with the land, buildings and equipment "owned" by the large corporations yet actually including the land, buildings and equipment owned by subsidiaries of such holding companies as the United States Steel Corporation, which *own* almost no tangible assets (page 67). Even the closing paragraph in the book, the only concrete evidence offered by Mr. Tucker and his associates to indicate that the distinction between "assets owned" and "property controlled" had been maintained, fails to support his contention. It appears to be concerned with a different type of control than that exercised through property rights and makes *no reference at all* to the distinction between "assets owned" and "property controlled."

There is no question that the figures for assets or wealth *owned* by the largest corporations would be smaller than those for assets *controlled* by them directly or through stock ownership. Which is the more significant figure in discussing "big business" and the "concentration of corporate wealth" can be a matter of opinion. But the figures on corporate assets presented in the book are more nearly assets controlled than assets owned,

and indication is given that, if complete consolidation had been feasible, the figures for assets controlled would have been the ones given. The pretense that the figures represent assets owned must be an afterthought on Mr. Tucker's part.

4. According to Mr. Tucker and his associates the reviewer has insisted "that governments should be regarded as large corporations." This is simply not true. The reviewer objected to the inclusion of Government figures in data purporting to cover the categories "medium or small corporations, firms not incorporated and individuals," and the category "all business activity in the United States." An insistence that Government figures be excluded from data on medium or small *business* does not constitute an insistence that Goverment be classed with large business corporations. The authors, in their criticism, agree that Government is not "business." A tripartite division is clearly called for.

The authors do point to one minor error in the review. The book clearly sets forth the method used in allocating the "national income produced by corporations" in each major branch of industry between large and smaller corporations but does not give the percentages actually used in making the allocation. Since the proportion of corporate assets controlled by large corporations is given, the reviewer, for purposes of comparison, calculated the corresponding figure for national income produced by corporations from the data given in Table 25. Inadvertently, reference was made to this figure as the basis for allocating the national income produced by corporations between large and smaller companies when actually the allocation was made for each major branch of industry separately. The corrected statement should read: "Once the questionable percentages underlying this figure of 32.3 per cent are arrived at . . . " instead of "Once this questionable figure of 32.3 per cent is arrived at. . . . " This error as to the method of calculation is most unfortunate even though the method of calculation was not germain to the paragraph in which the error occurred.

Of the two matters of opinion, the *magnitude* of the error due to the use of compiled receipts is a question which can only be answered by obtaining more adequate data; on the question of bias, no accusation of general bias was made. Rather evidence was given to show a statistical bias causing the figures obtained to minimize seriously the degree of corporate concentration. Evidence was also given of minor cases of verbal bias. These evidences have not been refuted in the communication above.

GARDINER C. MEANS

National Resources Committee
Washington, D. C.

The chapter on the rise of large corporations cannot be logically considered apart from the chapter on the growth and extent of incorporation but if it is so considered the fact is that only three pages out of twelve and a half are devoted to summarizing Thorp and Watkins. A fair reviewer is presumed to

consider not only the material presented but the thoroughness of the study on which the presentation is based, if he has knowledge of it.

Mr. Means was able to recognize rounded numbers when it suited his purpose in his original review; it is a pity he could not recognize that 92 and 96 are rounded forms of 92.1 and 95.7. If "Value Added" had been used for manufactures instead of "Value of Product," the figure would have been 91.5 and the importance of corporations would have been slightly reduced.

In his original review Mr. Means criticizes the book for not using consolidated statements except to the extent that income tax returns were based on them. That procedure, he said, "appears to minimize the true degree of concentration (of corporate wealth)." Now he criticizes the book because it did use consolidated statements for corporations making consolidated tax returns, on the ground that consolidated returns "included a large body of assets controlled but not owned by the parent companies" and therefore overstate the wealth of corporations. The procedure used in the book was necessitated by the nature of the material, as Mr. Means must know. Since the privilege of filing consolidated returns was limited to corporations owning at least 95% of the stock of their subsidiaries, the assets reported are for practical purposes assets owned, subject to the same sort of claims by creditors that the assets of any independent corporation are subject to, and the claims of the minority stockholders (if there are any) are too insignificant to worry about.

We insist that Government activity, if considered as a part of business activity, is not in the hands of corporate giants, and that the second statement of page 98 to which Mr. Means objects is true. The preceding statement on that page should have read "80% of all non-governmental economic activity," instead of "81% of all economic activity," to conform to the table on page 95—an unfortunate error which we regret.

It is impossible in a limited space to refer to other misstatements in Mr. Means's reply. We still believe that with all his innuendoes he has been unable to show any justification for his charge that the book is biased, either statistically or verbally.

RUFUS S. TUCKER
ALFRED L. BERNHEIM
MARGARET GRANT SCHNEIDER

REVISION OF THE BASE PERIOD FOR GOVERNMENT INDEX NUMBERS

The Washington Statistical Society held a meeting on February 28 to discuss the proposal to change government indexes to a recent base period. Morris A. Copeland, executive secretary of the Central Statistical Board, presided, and representatives of several statistical agencies led the discussion. The talks were pointed toward three questions:

1. Is a revision of the base period for government index numbers desirable?

2. If a change is made, when should it become effective?
3. What are the pros and cons of 1935–1937 as a new base period?

Maxwell R. Conklin of the Division of Research and Statistics of the Federal Reserve Board made no definite recommendation for change and cautioned careful study before a shift is made. The 1923–25 base used by the Board for its indexes, while a good base when it was adopted, has in recent years developed several weaknesses that limit its value for current use: (1) residential building activity was at a peak during the 1920's and in the years since the indexes for building and building materials have been low in comparison with other series; (2) changes in technology and in demand have caused marked shifts in the relationships between individual series; (3) no composite index number involving both price and volume is reliable over a long period of years; (4) a number of series, such as production of liquors and glass containers, man-hours, etc., have assumed importance or become available only recently and cannot be extended to a fifteen-year old base period.

The change to a 1935–1937 base would have little effect on the level of the Board's general production index or the group indexes of manufacturing or mining, but it would make considerable difference in the relationships among many individual series. A later base would facilitate the use of new weights for component series, but it should be kept in mind that the weight period and the base period do not have to be the same and one may be changed without changing the other. In all recent years, including the proposed 1935–1937 base period, building activity has been at a low level and prices and volumes generally have shown sharp fluctuations. In view of these conditions, it is doubtful that relationships prevailing in the 1935–1937 period will be indicative of the future. While recognizing the need for a more recent base, Mr. Conklin pointed out the difficulty of selecting a specific period that would be sufficiently stable to justify a change in the base of government index numbers generally and advocated postponing a decision until 1939 or 1940 when additional information would permit more careful consideration of the problems involved.

Lowell J. Chawner of the Division of Economic Research, Bureau of Foreign and Domestic Commerce, noted three general considerations in the choice of a base period: (1) public users of general index numbers, whether professional statisticians wish it or not, frequently attach the concept of normality to a base period; (2) the formulas most commonly used at the present time involve the use of base period weights or a variation thereof; (3) the dispersion of the component relatives from a base should be as small as possible.

Although many conditions such as the development of new primary statistics tend to form a change in the base period, Mr. Chawner said no recent period has the characteristics which would justify a shift at the present time. He felt definitely that 1935–37 would not be a satisfactory base since they were years of considerable instability in prices, with sharp declines in production during the latter part of the period. The relative importance of

durable and non-durable goods, and the relationship between employment and payrolls during this period is not likely to be typical of the next 10 years. The influence of payments of the veterans' bonus, government payments to farmers, and relief expenditures contributed in making the period an abnormal one. Relatives based on this period would soon show a greater dispersion than if an old base were retained.

Mr. Chawner said that in his judgment a question of greater importance than changing the base year is that of establishing comparable classifications between various series.

Miss Aryness Joy of the Bureau of Labor Statistics, on the other hand, said that from the viewpoint of the Bureau a change was unavoidable and imperative for certain indexes prepared by the Bureau, and stated that it would be necessary to put it into effect as soon as possible. All agencies cannot be expected to make the new base effective at the same time, but the B.L.S. has certain series in process of revision which involve a change of base.

While the Bureau of Labor Statistics is open to conviction as to the dates of the period, it must include or be subsequent to 1935. There has been a great expansion in the primary data available since then, which should be related to the base period. The cost of living division, for example, is completing a study of consumer purchases covering the years 1934–36 which will provide new weights for both cost of living and retail price indexes and will be the basis for introducing new commodities into these series. Anticipating this change, the retail price division has been collecting prices on many new items of food, clothing, furniture and rents which, individually, cannot be satisfactorily related to any base prior to 1935, and for which no price relatives could be published on an early base.

In wholesale as in retail prices extensive revisions of the component series are under way, and it is exceedingly difficult to obtain prices for earlier years. In the important field of employment and payrolls, the base period for the manufacturing series is 1923–25. Non-manufacturing industries were not covered until 1929 and that year serves as their base. Data on man hours were not collected until 1932.

Miss Joy stressed the importance of making available estimates in the form of absolute figures instead of or in addition to index numbers when possible.

O. C. Stine of the Division of Statistical and Historical Research, Bureau of Agricultural Economics, agreed that a recent base period was desirable, but said that no decision should be made until 1941. We are too close to the 1935–37 period to see it in the necessary perspective. A satisfactory base should be somewhere near the median of extreme fluctuations and should be years of relative stability when the various component series run approximately parallel. Taxes, interest payments, farm wages, etc. should be in stable relationship. A three-year base, in Mr. Stine's opinion, is not long enough; a period of five, six, seven or even ten years would be preferable.

The Department of Agriculture is at present tied by legislation to a pre-

war base, 1910–14. As a temporary expedient, 1924–29 has been chosen as a base for farm wages, one of the newer series.

Leifur Magnusson of the International Labor Office recommended waiting until there might be joint consideration by the I.L.O. looking toward the possibility that I.L.O. indexes and possibly those of some of the individual countries might be on the same base. An international committee might be set up.

Mr. Magnusson spoke of the desirability of having published actual figures rather than index numbers whenever it was possible. For the more uniform series such as hourly or weekly wages, and hours per week the absolute figures are most useful for most purposes. He acknowledged that index numbers were necessary for complex series such as cost of living.

General discussion from the floor followed the scheduled talks. There were divergent opinions as to whether weights should be drawn from the same period chosen for the base. In response to a question, Mr. Wilcox of the B.L.S. said that one reason why 1935–37 had received favorable consideration as a base period was that it included two Census of Manufactures years.

The whole problem of the choice of a recent base period will receive further attention through the Central Statistical Board's Committee on Techniques of Statistical Analysis.

Subsequent to the meeting, Mr. Magnusson received a letter from Mr. John W. Nixon, Chief of the statistical section of the I.L.O. in Geneva, in which he treated the question of the base period. An excerpt from Mr. Nixon's letter follows:

> . . . this is a rather difficult question. It is one which concerns various branches of statistics, and has been discussed by the Committee of Statistical Experts of the League of Nations, which decided in December 1933 that:
>
> (1) No post war period satisfies fully the conditions desirable for a uniform base period for economic index numbers;
>
> (2) In view of the impossibility of foreseeing at present and at what levels a relative equilibrium will be reached, it would seem premature at this stage to attempt the realization of recommendation IX of the Conference relating to economic statistics.
>
> I think this position still holds and that it is too early to fix any new base period. The difficulty is to find a normal period. The years 1934–36 do not appear to have been very normal in the U.S.A. The indexes of employment and payrolls fluctuated more during this period than during the years 1925–27 and were, moreover, considerably below the level of these years. For our own publications, we convert index numbers of cost-of-living, wages, employment, etc. to the base period 1929 and the League of Nations does the same in its statistical publications. We found it necessary to adopt some uniform base period for our international tables in view of the different base periods used in the different countries, otherwise comparisons of fluctuations would be impossible, and 1929 was adopted

for convenience, and as being one of the most normal of recent years. I think the matter will be taken up on the international plane in due course, but the present time is, in my view, somewhat premature.

PROGRESS OF WORK IN THE CENSUS BUREAU

CENSUS OF MANUFACTURES

The collection of data for the 1937 biennial census of manufactures began last January with the mailing of about 230,000 schedules to establishments on the Bureau's list. Many of these will be eliminated later because the concerns have gone out of business or are not manufacturers or do not have an annual value of products amounting to $5,000. Perhaps 180,000 will be included in the census. Up to the end of April about 115,000 of the schedules sent out had been filled in and returned. Follow-up correspondence for the purpose of obtaining data needed for the correction and completion of defective returns is necessary for about one-third the schedules received.

At one time the data for the census of manufactures were collected through a field canvass conducted by special agents employed to visit all manufacturing concerns and fill in the schedules. In the quinquennial census for 1914, a force of 1,300 special agents was organized for this undertaking, and the cost of the field work was approximately $500,000. The present practice, which began when the census was made biennial in 1921, is to collect the schedules by mail so far as possible. But as not more than 75 per cent of the schedules are obtained in that way, it is still necessary to employ agents in the field to get in returns from delinquents and to obtain the correction of faulty schedules received by mail and not corrected by correspondence. The agents—approximately 150 in number—are not appointed until the mail collection has been in progress for about three months. They are local men most of whom have had previous experience in this work, covering in many cases three or more censuses. A number of the employees on the permanent force of the Bureau are sent out from Washington to "clean up" the work in large cities. It is estimated that the cost of field work for the current census will not be over $100,000.

This great reduction in the cost of census taking now as compared with earlier censuses, however, is not due entirely to the change in the method of collecting the data. It is partly the result of eliminating from the canvass the smaller establishments—those having an annual value of products below $5,000. This change—made when the census began to be taken biennially—reduced the number of establishments to be canvassed by 22 per cent but made a difference of less than 1 per cent in the total number of wage earners and the total value of products.

One new feature of the 1937 census is the collection of inventory data to be reported for both the beginning and the end of the year under two heads: (a) finished products of the plant and (b) materials, supplies, fuel, work in progress, and all other inventories. There is an urgent demand for informa-

tion of this kind, and the attempts to collect it that have heretofore been made both by governmental and by independent agencies have not been very successful.

The final report of the 1935 census of manufactures, a volume of about 1,300 pages, will be off the press by June 1. Practically all the material it contains has been published in series of State and industry reports, which had all been issued or sent to the printer by the end of August, 1937.

MEASURING TOWNSHIP AREAS

During January, 1938, the Bureau began the work, financed in part by W.P.A. funds, of measuring the areas of townships and other minor civil divisions in certain states. Provided funds are made available during the next fiscal year, it is anticipated that all of these areas in the United States will be measured in time to be included in the reports of the Sixteenth Decennial Census.

This will make it possible for the first time to give density statistics for minor civil divisions and to map density areas defined by the boundary lines of these divisions. Heretofore the smallest political division for which such data could be given was the county. It is anticipated that the minor civil division figures will be used in the preparation of a large scale population density map of the United States.

This mapping work was not undertaken prior to the Census of 1930 because of the inadequacy of the map records in many states. But the mapping programs of the past few years, notably those of the Tennessee Valley Authority, the Geological Survey and the Coast and Geodetic Survey, have furnished or will furnish state and county maps of sufficient accuracy.

Measuring the minor civil divisions of the United States is part of a long range program, which has included the preparation of a complete map record of every census area and the publication and sale, at a nominal cost, of state minor civil division outline maps for the Census of 1930. In preparation for the census of 1940 these maps will be revised to conform to changes in the boundaries of political divisions made since 1930 and to utilize the more accurate map data now available.

TABULATION OF UNEMPLOYMENT REGISTRATION COMPLETED

The data secured during the week of November 16–20, 1937, in connection with the registration of the unemployed and partly unemployed have now been tabulated and published. The preliminary count, showing three classes by sex, was completed before the end of December; the results of this count were given to the press early in January and published on January 18, 1938, in the form of a preliminary report giving statistics for States, counties, and cities. The final figures for the three classes, which differed from the preliminary figures by only a few thousand in each case, were as follows: Totally unemployed, 5,833,401, emergency workers, 2,011,615, and partly unemployed, 3,219,502.

For the detailed tabulations, more than 13,000,000 cards were punched

and run at least seven times through the sorting and tabulating machines. The machine tabulation was completed early in April and the last copy for the reports will be sent to the printer about the middle of May. While this inquiry was not officially a Census Bureau inquiry, the work of tabulating the returns was handled by the Bureau for the Administrator of the "Census of Partial Employment, Unemployment, and Occupations." A maximum of about 1,750 persons were employed on this project at the peak of operations. Both the preliminary count and the final tabulations were completed in what is probably record time for an undertaking of such magnitude.

The detailed tabulations cover the following subjects for each of the three classes, so far as applicable: Color or race; sex; age; occupational groups; industry; residence (farm or non farm); number of hours worked "last week" —that is, the week preceding the registration; number of weeks worked "last year;" number of dependents; number of other workers in the family; and income "last week." Of special significance are the distributions by sex, age, occupation, and industry.

The results of these tabulations were given out first in a series of more than 400 press releases, followed by a series of State bulletins, with a summary for the United States. These bulletins will be assembled into volumes to form a part of the final reports.

There is also a volume giving the results of the so-called enumerative check, which was an actual enumeration of sample areas covering in the aggregate 1½ per cent of the population of the United States. This enumeration not only served to give some idea of the completeness of the voluntary registration, but also furnished much supplementary information with respect to the classification of the unemployed and their relation to the fully employed, to the whole number of persons normally employed, and to the population as a whole.

SPECIAL TABULATION OF DEATHS

The division of Vital Statistics is compiling special tables showing the number of deaths from cancer, tuberculosis, and puerperal causes according to the place of death and place of residence for the year 1935. The work on this study, which is being done as a District of Columbia WPA project, involves the reallocation of non-resident deaths from these causes for every city and county in the United States. Final tables, to be published as Vital Statistics Special Reports, will show the number of deaths occurring in each area, the number of non-resident deaths, the number of deaths of residents occurring in other areas and the total number of resident deaths.

J. A. H.

STATISTICAL NEWS AND NOTES

Board of Governors of the Federal Reserve System

Statistics of international capital transactions of the United States for the full year 1937 were published in the *Federal Reserve Bulletin* for April 1938. The same issue contained, on an earlier page, a chart showing separately central bank balances and other foreign balances in the United States during 1937, excluding funds earmarked for the redemption of foreign securities held by Americans.

Federal Home Loan Bank Board

The compilation and publication of a series of building cost indexes and a series of estimated mortgage lending activity of savings and loan associations are being continued. The Federal Home Loan Bank Board is engaged in a study of the home mortgage financing and real estate operations of life insurance companies in the United States. This project includes the amount of non-farm home mortgages held by insurance companies, the volume of loans made during 1937, and real estate holdings and sales. It is expected that the study will be completed and available for circulation before the first of June.

In the near future a recapitulation of the consolidated annual reports of all member institutions of the Federal Home Loan Bank System will be prepared. This summary will contain by states and by type of association the dollar and percentage distribution of total assets and liabilities of all members of the System.

Bureau of Foreign and Domestic Commerce

Material which formerly appeared as Volume I of the *World Economic Review* was presented in the March issue of the *Survey of Current Business*, which has been designated as the Annual Review number. The issue was devoted to an analysis of economic trends in 1937 with the interrelations between the various elements in the economic system discussed with special emphasis given to maladjustments which developed late in 1936 and early in 1937. The various sections of the review are amply supported by charts and tables dealing with the more important business indicators. The June issue of the *Survey* carries the official estimates of the national income for 1937, while two articles of especial interest "Income of Independent Professional Practitioners" and "The Present Status of Fair Trade Laws" appeared in the April and May issues, respectively.

The 1938 *Supplement to the Survey of Current Business* will be released in July. This volume presents the statistical record of economic trends in the United States and in Canada by months for the years 1934 to 1937, inclusive, together with the monthly averages on annual indexes back to 1913 where available. Comprehensive notes on sources of the material and methods of compilation are also included.

A publication of major interest, the "Atlas of Wholesale Grocery Trading Areas" was recently issued by the Bureau. This report was compiled with the cooperation of the wholesale grocery trade, and is designed to present a true, realistic picture of the trading areas pertaining to the major centers of wholesale grocery distribution with a further purpose of presenting the latest pertinent market data which may be used to evaluate the various areas described. There is an increasing need for such information and this publication should be of assistance to research directors of advertising agencies and publishing houses, economists, and general students of wholesale distribution.

Beginning with January of this year "Retail Sales of Independent Firms in 25 States by Kinds of Business" has been currently presented in the 10th of the month issue of *Domestic Commerce*, a Bureau publication. Data are shown for 23 kinds of business and for city size groups, together with an analysis of current retail activity based on these and other sales data collected by the Bureau. For the past several years independent retail store sales have been collected by the Bureau and separate releases issued for each of the states covered. This service is now in operation in 26 states, and it is planned to expand it to include all of the states in the Nation as rapidly as possible. *Domestic Commerce* which appears on the 10th, 20th, and 30th of each month contains data on new Governmental studies of interest to business men, as well as information on research activities and marketing studies from non-governmental sources. A survey obtaining suggestions to make it still more valuable has recently been completed.

The 1938 edition of *Market Research Sources* which brings up to date the record of marketing research in the United States was released in May. All known available sources of research in this field have been included. This edition (the seventh) lists material published in the years 1933 to 1936, inclusive, and most of 1937, and includes a suggested list of periodicals with the addresses of the publishers. There are also listed in this volume all market studies which have been made by newspapers that have come to the attention of the Bureau of Foreign and Domestic Commerce.

The publication of a series of trade bulletins for individual countries has been inaugurated. These bulletins, the first of which appeared in February, give preliminary figures for 1937 on trade of the United States by commodities with leading foreign countries and bring up to date material in *Foreign Trade of the United States, calendar year 1936* which was released in April. Countries for which bulletins have already been issued are Belgium, Canada, China, Japan, Mexico, Netherlands, Union of South Socialist Republics, and the United Kingdom; bulletins in process of preparation include Argentina, Brazil, British South Africa, Chile, Cuba, France, Germany, Italy, and the Netherlands Indies. The annual *Summary of the United States Trade with the World* for 1937 is now available.

A publication which is due to make its appearance in the early summer is "Rubber Statistics, 1900–1937, Production, Absorption, Stocks, and Price." This pamphlet contains a great deal of basic statistical data necessary to a

study of the development of the rubber manufacturing industry and should prove useful to rubber manufacturers, importers, dealers, and others interested in the rubber trade.

Federal Trade Commission

By House Joint Resolution No. 594, approved by the President April 13, Congress has directed the Federal Trade Commission to investigate the policies employed by manufacturers in distributing motor vehicles, accessories and parts and the policies of dealers in selling motor vehicles at retail as these policies affect the public interest.

One of the purposes of the investigation, as stated by the Resolution, is to determine the extent of concentration or monopoly in the manufacturing, warehousing, distribution and sale of automobiles and of accessories and parts, prevailing in the industry. The Commission is also directed to investigate the methods and devices used by manufacturers in obtaining or maintaining such monopoly or concentration. Inquiry is to be made into all fraudulent, unfair and injurious methods, including price fixing and unfair trade practices, employed by members of the industry. Violations of the antitrust laws of the United States are included in the scope of the investigation.

The Commission is given one year from the date of enactment of the Resolution in which to make its report to Congress, which is to include recommendations for whatever remedial legislation it deems necessary and proper. The appropriation of $50,000 is authorized by the Resolution for the purpose of making the investigation.

Department of Agriculture Graduate School

The Statistics seminar of the United States Department of Agriculture Graduate School has been meeting semi-monthly under the direction of Dr. W. E. Deming and Mr. A. Sturges as part of the official program of Government work. Recent speakers and their topics have been: Dr. R. G. D. Allen of London. "Difficulties in the Application of the Chi Square test to Economic Data;" Mr. Lester Frankel, "Transformations to Achieve Normality of Frequency Distributions;" Mr. A. Blake, "Theory of Least Squares from the viewpoint of Dr. E. H. Moore;" and Dr. Chester I. Bliss, "Time Mortality Treatment."

Bureau of Agricultural Economics

Among the recent publications of the Bureau of Agricultural Economics have been "An Analysis of the Effects of the Processing Taxes Levied under the Agricultural Adjustment Act," "A Study of Factors Affecting the Price of Dry Edible Beans in the United States, by Classes," "The Preparation of Statistical Tables—A Handbook" (now in its second edition of 2,000 copies), and "Soybeans in the United States; Recent Trends and Present Economic Status."

Several changes have recently been made in the statistical work of the Bureau as the result of the work of the Bureau Statistics Committee in cooperation with various divisions in the Bureau. The most important change in organization has been to set up in the Division of Crop and Livestock Estimates a Marketing Statistics Section. This new section is now responsible for the cold storage reports and the transportation reports and also for several kinds of market data formerly gathered by some of the market news offices. The section was set up in order to provide for better coordination of marketing statistics now collected in the Bureau and in order to provide a more complete and adequate set of data on marketing.

A statistical pool is being set up in the Division of Statistical and Historical Research. This pool is to maintain a complete catalogue and index of all statistical series in the Bureau, and is to be prepared to answer any requests for statistical information made either by specialists within the Bureau or by outside parties. Some of the tabulation of statistical data is being transferred from the Division of Statistical and Historical Research to the market news sections of the commodity divisions and to the Foreign Agricultural Service Division.

Among the changes which have been made in the published data of the Bureau are the adoption of uniform definitions of marketing seasons for all agricultural products, the dropping of monthly reports of the condition of crops in most cases and the substitution of indicated yield per acre, and the changing of the former "intentions to plant" report into a report on "prospective plantings." This last change was made because the present reports are considerably more than a simple average of the intentions reported by farmers. These latter reports are used along with other statistical information to estimate as accurately as possible how much of each crop is likely to be planted.

The committee has recently been reviewing the statistical publications of the Bureau in considering changes which might make agricultural statistics more readily available or more easily understood. Any suggestions along this line from members of the American Statistical Association would be greatly appreciated by the Committee.

Social Security Board

Publication of a monthly bulletin reporting current operations under provisions of the Social Security Act was begun during March. The new *Social Security Bulletin* will carry regularly summary data showing, among other developments, current receipts and expenditures under all titles of the Social Security Act; total costs of public aid in the United States, including public assistance under the Social Security Act, earnings under the Works Program, general relief, and other forms of aid provided to persons in need from Federal, State, and local funds; estimates of the number of different households receiving one or more of these types of aid during each month, and of the number of individuals comprising these households; contributions received and benefits paid under State unemployment compensation laws;

payments under the Federal old-age insurance program; and other data which together afford a comprehensive record of developments in the field of social insurance and public assistance. Special articles and reports on research in the field of social security will also be published in the *Bulletin*. Articles in the first (March) issue include summaries of studies dealing with the economic status of the aged population of the United States; almshouse care and old-age assistance; the program for statistical reporting by State unemployment compensation agencies and the pay-roll report forms of these agencies; the estimated volume of employment covered by State unemployment compensation laws; an analysis of the effect of unemployment benefits on 2,500 relief cases in Philadelphia; and an article on "Social Security and the Social Services," by Arthur J. Altmeyer, Chairman of the Social Security Board. The *Bulletin* is prepared in the Bureau of Research and Statistics, and is on sale by the Superintendent of Documents, United States Government Printing Office.

The development of facilities for the prompt exchange of relief information among public relief agencies of large cities has been undertaken by the Division of Public Assistance Research of the Bureau of Research and Statistics, in response to the special request of administrators and statisticians in several cities. A subcommittee consisting of Ralph G. Hurlin, Chairman, Helen R. Jeter, Howard Myers, and Saya S. Schwartz, was appointed by the Joint Committee on Relief Statistics of the American Public Welfare Association and the American Statistical Association to advise the Bureau in this undertaking. Tabulations of data for January, February, and March have been mailed to cooperating cities and to State departments of public welfare. Summaries will be published from time to time in the *Social Security Bulletin*.

The Division of Public Assistance Research is undertaking a series of regional statistical conferences arranged through its field representatives in the twelve regional offices of the Board. The first of these, arranged by Anne Geddes in Boston on October 4 and 5, 1937, included relief and public welfare statisticians from the New England States. Ralph Hurlin, Director of Statistics of the Russell Sage Foundation, discussed the purpose and planning of statistical publications. The second conference, held near Birmingham, Alabama, on March 21–23, was conducted by Hallie Price, regional representative of the Division of Public Assistance Research. Statisticians from departments of public welfare in South Carolina, Alabama, Georgia, Mississippi, and Tennessee discussed the problems of collecting reports from counties, securing an unduplicated count of cases, the method of tabulating and analyzing social data about recipients, the planning of monthly statistical bulletins and special studies. The regional statistical conference arranged in Dallas, Texas, on March 24–26, by Earl Pemberton, representative of the Division in the San Antonio regional office, was the first attempt at joint conference between unemployment compensation statisticians and public welfare statisticians. Representatives from the State agencies administering public assistance and unemployment compensation

in Texas, New Mexico, and Louisiana presented papers on the uses of unemployment and public welfare statistics for public information and public relations, costs of various methods of presenting statistical reports, and the uses of statistics for operations control.

A manual covering a suggested method of conducting a case census has been completed by the Division of Public Assistance Research. When printed copies of the manual are available, it will be distributed to State departments of public welfare and to local agencies interested in conducting a case census. Such a census, however, will not form part of the statistical procedure required by the Social Security Board.

The first regular statistical reports on unemployment-benefit operations of the benefit-paying States were received during February and March by the Board. Data from these reports have been analyzed by the Division of Unemployment Compensation Research of the Bureau of Research and Statistics, and tables showing initial and continued claims received, and number and amount of benefit payments, have appeared in the *Social Security Bulletin*.

Memoranda have been prepared in the Division of Unemployment Compensation Research on the development of the Code for Industrial Classification used by State unemployment compensation agencies, on tips in relation to wages under the social security program, and on suggested methods for determination of seasonal employments in connection with administration of unemployment compensation laws.

A number of studies to determine sickness and disability rates in the United States are being undertaken by the Division of Health Studies of the Bureau of Research and Statistics. Disability experience in European countries, where social insurance against disability has made possible the accumulation of dependable statistics, is being summarized and analyzed. The foreign experience is also being applied to the population of the United States, with proper corrections and modifications for differences in age, sex, economic status, occupation, and other variables. In addition, available statistics on sickness and disablement in the United States are being brought together. Account is being taken of data accumulated through sickness surveys, the experience of retirement plans containing disability provisions, and experience in commercial insurance against sickness and disability.

A study of family composition in the United States is being made in Richmond by the Division of Health Studies, with the assistance of funds granted by the Works Progress Administration. The project involves detailed study of a sample of approximately 800,000 families from representative cities of 19 States, and from 23 rural counties. The data have become available through the schedules of the National Health Inventory recently conducted by the United States Public Health Service. The study is intended to provide a more accurate knowledge than has hitherto been available of the size and composition of American households and families.

Bureau of Labor Statistics

Four new bulletins have been issued by the Industrial Relations Division dealing with a review of strikes, 1880–1937 (Bulletin No. 651), union wages and hours, May 15, 1937, in the building and printing trades (Nos. 657 and 655), and characteristics of company unions, 1936 (No. 634). The April issue of the *Monthly Labor Review* carried a summary of the company union study. Analyses have been made of collective bargaining by the United Electrical, Radio, and Machine Workers of America, and of union agreements in the cement industry. A study of seniority provisions in union agreements is under way.

Employment and earnings of office employees in manufacturing establishments for January, June and December of 1935, June and December of 1936, and June and December of 1937 are shown in a study being completed. The Bureau's employment and payroll indexes for coal mining, year-round hotels, laundries, and dyeing and cleaning establishments have been revised to conform with the trend shown by the 1935 Census for these industries. The indexes for manufacturing industries are now being adjusted to the levels of the 1935 Census of Manufactures.

In September 1937, in conjunction with the regular monthly survey of employment, earnings and hours, data were secured for men and women employees separately among the important women-employing states and industries. The data were analyzed and released by the Women's Bureau. A similar survey was made in March, and will be continued semi-annually in September and March.

In the field of industrial injury statistics two special studies have recently been completed. One covers 70 industries in the year 1936, and presents injury rates for these industries by individual states. The other represents the first study of injuries to workers in the construction industry which has been undertaken by the Bureau, and covers also the year 1936. A number of articles based on the survey of workmen's compensation administration have been published in the *Monthly Labor Review* in advance of the complete bulletin; an article on "Claims Procedure and Administration" appeared in the May *Review*.

Wage and hour studies have recently been completed for the following industries: bituminous coal, cotton textiles, radio and phonograph, electrical machinery and apparatus, and explosives. Surveys are under way for furniture, soap, meat packing, fertilizers, woolen and worsted, and the dyeing and finishing of textiles. A preliminary report has been prepared on paid vacations in industry.

In the field of construction statistics, a project financed by WPA funds has been launched which will furnish information on (1) the volume of building prior to 1920; (2) residential construction, by cost groups and type of material, 1936–38; (3) number of dwellings erected in unincorporated areas within metropolitan districts of large cities, to be combined with regular reports of the Bureau as a basis of estimating total non-farm resi-

dential construction; (4) relationship between permit valuations and selling prices of dwellings.

A new bulletin (No. 650) presents a review of construction from 1921 to 1937, a detailed comparison of construction activity in 1936 and 1937, and a summary of the special building permit survey which covered the years 1929–1935. Over 100 individual city reports have been issued on the basis of this survey. "PWA and Industry" (Bulletin No. 658) shows the effect of PWA expenditures for different types of construction, analyzes the amount of labor created at the site, the amount of money spent for various materials, and the amount of labor created in fabricating materials. With the awarding of contracts by the Federal Housing Administration, the Bureau will collect data on employment, payrolls and hours worked under these contracts.

A special study of labor turnover in the slaughtering and meat packing industry in 1936 and 1937 has been made and another will soon be released on petroleum refining. In addition to the general turnover rates for all manufacturing, separate rates are now published monthly for 20 industries.

An extensive program is in progress for tabulating and analyzing retail price records to determine the adequacy of the data for use in the indexes of food and other cost of living items, and for the publication of average prices as such. Work is being completed on a history of retail food prices from 1890 to date, to include methods of price collection and the computation of average prices and indexes. A retail food price bulletin (No. 635) containing average prices and indexes from 1923 to 1936 has been issued.

The income distribution of native white families containing both husband and wife, as revealed by the urban survey of consumer purchases, was shown in an article in the March *Monthly Labor Review* for all cities included in the study. Mimeographed releases presenting also data on expenditure distributions of the same types of families are being issued for individual cities. Families within an income range of $500–$10,000 are included.

To meet the demand for a discussion of the methodology used in the construction of index numbers of wholesale prices of the Bureau, a reprint of Part I, Bulletin 284, "The Making and Using of Index Numbers" by Wesley C. Mitchell has been issued. The publication bears bulletin number 656, and single copies are available on request to the Bureau. For quantities of three or more, orders should be sent to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. or to the Bureau of Labor Statistics.

The revised prices and index numbers for the farm machinery, soap, underwear, and boxboard industries were introduced with the computation of the January 1938 general index number. There are available upon request to the Bureau the following mimeographed publications: "Estimated Value in Exchange and Relative Importance of Commodities Included in Weighted Index Number of Wholesale Commodity Prices for the Year 1937," "Specifications of Commodities Entering Into the Composite Weighted Index (Revised)."

United States Employment Service

Tabulation work in connection with a detailed survey of all registrants in the active file of the United States Employment Service which was taken in field offices as of April 1 is now nearing completion. This survey, which is similar in form and content to five previous surveys, provides detailed information concerning the number, distribution and characteristics of all jobseekers in public employment offices throughout the country. Tables giving occupational and industrial classifications, age, education, and veteran status, with cross-classifications by sex and for each sex by color are provided by this study. Geographic breakdowns are prepared by states and within each state by counties or districts.

The active file of the Employment Service, upon which the records of this survey are prepared, is composed of all persons currently in active search of jobs through the facilities of the Employment Service. It includes the voluntary registration of all types of workers. Applications for all unemployment compensation claimants in benefit-paying states are included in the file, since registration with Employment Service offices is a prerequisite to receiving unemployment compensation benefits. At the present time there are twenty-five benefit-paying states and on July 1 three additional states are scheduled to begin payments.

Over six and three-quarter million registrations were included in the April inventory survey, approximately five and one-third million representing men.

To supplement the periodic complete national surveys of the active file covering *all* registrants, methods are being developed whereby indications of the distribution and characteristics of the active file can be secured through a representative sample. According to present indications it will be possible to secure a representative sample from the records of some ten selected states. The validity of such a sample is being carefully checked.

The Worker-Analysis Section of the United States Employment Service has finished the standardization of preliminary selection and classification techniques for several clerical occupations. These techniques are considered preliminary until thoroughly checked by follow-up studies. (The validity of the predictor batteries is represented by the following multiple correlation coefficients: Bookkeeping Machine Operators, .51; Calculating Machine Operators, .69; Comptometer Operators, .69; Hand Transcribers, .51.) In addition to studies of clerical workers, preliminary predictor batteries have been standardized for Lamp Shade Sewers and Power Sewing Machine Operators.

These experimental selection and classification techniques have been introduced into employment offices in approximately 40 cities during the period from November 1937 to April 1938. These techniques include typing, stenographic, and certain clerical tests, as well as standardized trade questions. There are now approximately 120 cities where various standardized techniques have been introduced into employment office procedure.

Women's Bureau, U. S. Department of Labor

A new series of reporting has been undertaken by the Women's Bureau to fill the need for some indication of the general direction of women's wages and employment. With the assistance of the Bureau of Labor Statistics and of various State labor departments, pay-roll information for a typical pay period in September 1937 was obtained on special forms sent out to the various cooperating manufacturing plants in connection with the regular reports furnished each month to the Bureau of Labor Statistics. The resulting material as compiled shows the average week's earnings, average hours of work, and average hourly earnings of some 500,000 women in 43 industries in the 12 large industrial States that employ three-fourths of the women in manufacturing. For the averages shown the data are weighted according to the relative importance of men and women in each industry. Similar reports are being requested for March and will again be asked for in Septemper, 1938. The plants that can cooperate in furnishing these reports are those that have better organized pay rolls, and consequently the wages shown are higher than those found by an investigation of all types of plants in an industry; nevertheless they will constitute a basis for discovering, on a broad geographical and industrial base, the trend of women's wages from period to period.

The Bureau made a survey of women's wages and hours of work in Kentucky in late 1937 or in early 1938, and furnished supervision to assist the State labor department in Arizona in making such a survey as a basis for wage determination under the new Arizona minimum-wage law. The reports issued for Kentucky showed women's median week's earnings of $13.70 in department stores (regular workers, not including part-time workers), $13 in manufacturing plants, and $9.05 in commercial laundries ($9.10 for white, $8.70 for Negro women). Nearly a fourth of the women in department stores and almost half those in limited-price stores were part-time workers. Wages were somewhat higher in Louisville than elsewhere in the State.

At the request of the Millinery Stabilization Commission, which was formed in 1935 by agreement between labor and employers at the suggestion of the Mayor of New York, the Women's Bureau is conducting a survey of the millinery industry in order to assist in improving the situation of the industry and its workers. This study will include information on fluctuations in employment, hours, earnings, and production during 1937, and also is considering variations among the different plants and areas in cost of production, receipts, and labor productivity. Methods of selling factory products will be examined, with the assistance of other government agencies.

During the past year the Bureau has made field investigations of wages in various men's clothing industries that are large employers of women, in order to assist the Public Contracts Board in determining fair minimum wages to be paid workers on goods for government purchase. The average week's earnings of the women reported ranged from $9.90 in work-shirt factories to $18.60 in the manufacture of neckwear. Other industries covered

were shoes, caps and hats, dress shirts, sportswear, raincoats, work gloves, knit underwear, cotton underwear, work clothes, handkerchiefs, and seamless hosiery.

Division of Social Research, Works Progress Administration

Methodology of Regionalization and Subregionalization. The delineation of socio-economic regions and subregions for the rural-farm population of the United States has been undertaken to assist in the work of social planning and research. Based on the county as the unit, broad regions were delineated on the basis of major types of farming, a rural-farm plane of living index, an index of population fertility, and the percentage of farm tenancy. By means of these and additional indices such as percentage of farms producing less than a given amount of income in 1929, percentage of farm produce used on the farm, per capita land value, and per cent of the rural population engaged in farming, subregions are being differentiated. On the basis of careful statistical testing of variations in the indices from county to county, boundaries between regions and subregions are being fixed to represent a final approximation to socio-economic areas.

Net Number of Relief and Nonrelief Households. Estimates of the total unduplicated number of relief and nonrelief households and persons receiving relief, Works Program, and emergency employment each month from January 1933 to date, with a breakdown by agencies for the month of July of each year have recently been released. These estimates have been prepared jointly by the Division of Social Research and the Division of Research, Statistics and Records of the Works Progress Administration, and the Division of Public Assistance, Research, Social Security Board.*

Migratory Cotton-Pickers in the Southwest. Work is nearing completion on a study of migratory cotton-pickers in Arizona and New Mexico during the 1937 season. Some of the aspects of the situation which will be considered in the report are the nature of the demand for cotton-pickers, the effects of mechanization and concentration of land ownership, the origin and itineraries of the labor supply, methods used to recruit a large supply, wages, conditions of living, and health.

Standard Procedures. There are now available five standard procedures for operation of local research projects, issued for the purpose of developing comparable and useful State and local Works Progress Administration statistical projects. The procedures available are "Technique for Real Property Inventory," "Traffic Survey Manual," "Indexing Vital Statistics Certificates," "Compilation of Property Identification Maps," and "Index of Deeds, Mortgages, and Other Encumbrances." Eight other procedures are in process of preparation, and others related closely to the field of relief are planned.

Low Income Housing Area Surveys. A standard procedure on "Low Income Housing Area Surveys" is being prepared to develop local research projects which will assist the United States Housing Authority in the opera-

* See page 363.

tion of its program. The Federal Housing Administration and the United States Housing Authority are cooperating with the Division of Social Research in this work.

In order to locate appropriate areas for rehousing activities, information will be obtained on substandard conditions, family income, and rentals. The surveys will be conducted in areas found substandard according to Real Property Surveys. Real Property Surveys will be conducted in areas not previously covered. A great amount of local interest has developed in these surveys.

Analytic Index of Social Statistics. In order to fully utilize the great mass of statistics available in the field of relief and unemployment, a new type of card catalog, designed especially for statistical material, has been set up. By means of three-fold subject headings and a system of direct reference to individual tabulations, a reference unit has been established which will greatly facilitate the location of necessary data from a wide variety of sources.

Digest of State and Local Research Projects. Digests of State and local research projects carried on with relief funds are being prepared and planned for publication in one or more volumes in the next few months. The digests will be fully indexed for purposes of reference and will be a guide to the major findings of the great volume of projects conducted during the last few years.

Cooperative Plan of Rural Research. There is in preparation a detailed history of the Cooperative Plan of Rural Research, conducted by the Division of Social Research of the Works Progress Administration, in cooperation with the State Colleges of Agriculture. The report will include a summary of the research conducted in each State under the cooperative arrangement, brief statements of the methodology of the Federal surveys in which the States participated, and digests of the approximately 150 State publications and the Federal bulletins and monographs issued as a result of this cooperation.

Rural Youth, Their Situations and Prospects. Work is nearly completed on a general monograph concerning rural youth, which brings together from a wide variety of sources the results of field studies and the general literature in this field. Special attention is given to the programs of various governmental and nongovernmental agencies which provide services and opportunities for rural youth.

The Human Side of Destitution and Relief. Field work has been completed in Dubuque, Iowa, on a personal history study which is designed to supplement the mass of statistics available in the field of unemployment and relief. The study will provide an initimate story of individual experiences during the depression, will illustrate the great variety of stresses arising out of unemployment, and will show the personal adjustments made to the situations faced.

Age of WPA Workers. A bulletin on the age of Works Progress Administration workers is being prepared. The bulletin is largely an analysis of age

trends of Works Progress Administration workers during the 1½ year period between June 1936 and November 1937. At the end of the bulletin some of the more important available age distributions are presented for reference.

State Public Welfare Legislation. This study, which is now nearing completion, will make available the results of extensive legal research concerning public welfare legislation in the 48 States. The monograph will place particular emphasis on the laws providing for relief and public assistance, and on the agencies set up to administer such laws.

Publications of the WPA Division of Social Research. "The Costs of Living in 59 Cities," Research Monograph XII, by Margaret Loomis Stecker, has been received from the Government Printing Office and is now ready for general distribution. The printed edition includes charts, tables, and budget data omitted from the mimeographed edition previously released. By applying indices of living costs to data from this study on intercity differences in costs in March 1935, the Bureau of Labor Statistics has been able, for 31 of the 59 cities, to obtain an approximation of the intercity differences as of December 15, 1937.

"Effects of the Works Program on Rural Relief," Research Monograph XIII, by Rebecca Farnham and Irene Link, is now ready for distribution. The monograph describes the effects of the transfer, during the latter half of 1935, of needy cases from the rolls of the Federal Emergency Relief Administration to more specialized programs of assistance. Data were obtained for this study from records of 5,377 families who were dependent on relief during June 1935 and who were dropped from the relief rolls during the succeeding five months. These families lived in 71 rural counties in Montana, South Dakota, Wisconsin, Iowa, West Virginia, North Carolina, and Georgia.

Division of Research, Statistics and Records, Works Progress Administration

Works Program Statistics. The new reporting system, made effective in December 1937 when the responsibility for reporting was transferred from the Area Statistical Offices to the states, is now established on a working basis. State Statisticians have been approved for 38 states and in each of the other State Administrations a temporary designation has been made for someone to perform the functions of State Statisticians until a permanent appointment can be made.

The number and content of reports was considerably simplified when the state offices took over the responsibility for reporting. With this simplification many of the time series which had been established at the beginning of the WPA program had to be modified because of the difficulty of obtaining comparable data economically under the state reporting system. One of the most important items discontinued was the monthly series on the unduplicated number of persons employed by state and by county. It is essential for administrative purposes to have current figures on employment and the weekly series is much more readily available and well suited to this purpose.

Other changes have resulted in making certain data available quarterly instead of monthly and in making other data available only for the state as a whole instead of for individual counties.

Some additions have been made in the periodic reports previously outlined. These additions include a quarterly report of persons employed by occupational class; a report on labor turnover on WPA projects; a report of persons employed on NYA projects by type of work; and an analysis report on sponsors' contributions by type of material.

In addition to the regular reports, certain special tabulations have been carried out in the states. A study was made of Household Service Demonstration Center projects to provide data on the number of persons in training for domestic service, the number of persons placed after completion of training, and earnings received by these persons receiving jobs. Another study provided information on activities of NYA Resident Training projects, including costs of operation, employment, types of work activities, and types of courses studied.

Special tabulations or studies such as those mentioned above are supervised for the various operating divisions of the Federal Works Progress Administration by the Division of Research, Statistics, and Records. Procedures for obtaining the data are developed by the Division in collaboration with the individual State Statisticians who offer what technical assistance is necessary to the operating division which compiles the report in the state.

The inventory of physical accomplishments on WPA and NYA projects through October 1, 1937 has been completed and separate summaries have been prepared for all states. It is planned to make further analysis of some of the major items of work for certain counties throughout the country as requested by State Administrators.

Some preliminary data have been obtained from the tabulations being made from records formerly maintained in the Area Statistical Offices. These data indicate that over 7,000,000 different persons were employed on the Works Program from July 1935 through November 1937 including about 5,000,000 different persons who worked on projects operated by the Works Progress Administration. Further analyses of work histories of persons employed on the Works Program are in process.

Relief Statistics. Monthly estimates of the net number of households and persons receiving relief, Works Program employment and emergency employment have been issued in mimeographed form for the period January 1933 through January 1938. Separate releases have presented estimates for subsequent months. These estimates cover both those certified as in need of relief and non-relief personnel. Copies may be obtained from the Works Progress Administration. These estimates were prepared in cooperation with the Division of Social Research.

The monthly memorandum on the several Federal, State, and local relief activities prepared for the administrative use of WPA officials has been continued and a memorandum covering the month of February was issued in

April. A review of the year 1937 was contained in the memorandum for December which gave comparisons of annual relief expenditures for 1936 and 1937 for each State for the Works Program, National Youth Administration, the Civil Conservation Corps, the public assistance program of the Social Security Board, general relief, and the rural rehabilitation program of the Farm Security Administration.

Research. Work is under way interpreting unemployment in terms of family units. This study will bring together the various local censuses from which family data have been tabulated and will analyze the incidence of unemployment on family workers. A method of estimating the number of totally and partially unemployed families is explained and illustrated.

The construction of a price dispersion index has been undertaken. It involves the calculation, monthly and weekly, of the average deviation of various price indices from the All Commodities index. The basic data are the wholesale price series of the Bureau of Labor Statistics. The value of this measure seems to lie in its usefulness as an indicator of changes in economic activity. High price dispersion was, during the last decade, always associated with periods of recessions and low indices of dispersion with satisfactory employment, production, and profit conditions. Various tests of the significance of this measure are being prepared and the findings are to be written up.

National Research Project, Works Progress Administration. In March 1938 the Project published a *Summary of Findings to Date,* bringing together information available from reports hitherto published by the Project as well as preliminary material from studies now in preparation. In addition to the *Summary* the following reports have recently been issued: "Cigar Makers—After the Lay-Off," "Mechanical Changes in the Woolen and Worsted Industry, 1910 to 1936" (Summary, reprinted from *Monthly Labor Review,* January 1938), "Recent Trends in Employment and Unemployment in Philadelphia," and "Changes in Technology and Labor Requirements in Crop Production: Potatoes."

The following reports are in press:* "Fuel Efficiency in Cement Manufacture, 1909–1935," "Trends in Size and Production of the Aggregate Farm Enterprise, 1909–36," "Changes in Technology and Labor Requirements in Crop Production: Corn," "Changes in Technology and Labor Requirements in Crop Production: Cotton," "The Labor Force of the Philadelphia Radio Industry in 1936," "Philadelphia Weavers and Loom Fixers," and "Employment and Unemployment in Philadelphia in May 1936."

Office of Education

Cooperative Program on State School Records and Reports. In response to the resolution in December 1935 by the National Council of Chief State School Officers requesting the Office of Education to take such steps as were necessary to complete the study of uniform statistical reports of State school systems, to determine uniform procedures and definitions, and to assist the

* Some of the titles given below may be changed slightly before publication.

State departments of education to set up uniform records, the following steps have been taken cooperatively:

During 1936, revised definitions of terms used were sent to the States for criticisms and suggestions as bases for further modifications.

Analyses were made of basic recording and reporting forms in use in States to determine the items of information being secured by the States through the forms used by teachers, principals, supervisors, local superintendents, and others in making their required reports.

Tentative report forms were prepared suggesting "blocks of information," based on items determined through analyses in which States seemed to be interested.

Visits were made by representatives from the Office of Education to State departments of education for personal conferences with staff members to determine the extent to which the States, (a) agreed with and planned to use definitions of terms as revised, and (b) were interested in securing the items of information, as revealed in check lists from States in 1935 and as determined by analyses.

During 1937, tabulations and summaries, made of findings revealed by the personal conferences with State department staff members, were used as bases for further modifications of definitions of terms used and to be used.

Preparation was made of, (a) lists of desirable items of information that, in terms of current practices within States and of indications by States in personal conferences the previous year, should be available to the respective States and their subdivisions, and (b) suggested forms for recording these desirable items of information at their sources and for reporting such items as were found to be progressively needed by teachers, principals, and local superintendents and by State departments of education.

Criticisms and suggestions made by representatives of States in five regional conferences served as bases for supplementing and modifying actions and decisions previously determined and also served as guides to the individual States in efforts to make such revisions in its system of recording and reporting school data as it found and may find necessary.

The Cooperative University Research Program has resulted in several bulletins which give primary or derived statistics. These are *Economic Status of College Alumni*, Bulletin, 1937, No. 10; *College Student Mortality*, Bulletin, 1937, No. 11; *Some Factors in the Adjustment of College Students*, Bulletin, 1937, No. 12; *Economic Status of Rural Teachers*, Bulletin, 1937, No. 13; *University Unit Costs*, Bulletin, 1937, No. 21; and *State School Taxes and State Funds for Education and Their Apportionment in Seven States, 1934–35*, Pamphlet No. 78.

The Biennial Survey of Education for 1934–36 (Bulletin, 1937, No. 2) is being issued this year. Chapters dealing with statistics of school systems are (a) Statistical Summary, (b) Statistics of State Schools, (c) Statistics of City Schools, (d) Statistics of Higher Education, (e) Statistics of Public School Libraries, and (f) Statistics of Special Schools and Classes for Exceptional Children.

Study of Cumulative Records. The cumulative record cards of 177 school systems have been studied with the view to discovering the better practices in this area. Upon the basis of this analysis and a consideration of the known principles of pupil growth blocks of information which cumulative records might cover have been evolved. The results of this study have been published as Bulletin, 1938, No. 3, *The Use and Nature of the Cumulative Record.*

Pamphlet No. 83, 1938, *Handbook for Compiling Age-Grade Progress Statistics*, has been developed to aid school systems in studying their promotion methods. By an analysis made through the use of the statistical forms presented schools can discover what general types of maladjustment of pupils are present. The evidence from such an analysis may be used in revamping promotion policies, and in reorganizing instructional units. Also leads are given for the study of the adjustment of individual pupils.

United States Public Health Service

In connection with the program of the National Cancer Institute, which was established by Congress in 1937, the U. S. Public Health Service is undertaking three statistical investigations of cancer. The first of these is a study of the trend in the mortality from cancer by age, sex, race, nativity, geographic area and site of the disease. This investigation is being conducted with the cooperation of the Division of Vital Statistics of the Bureau of the Census which is supplying unpublished material. An analysis will be made of the recorded mortality for each state from the date of admittance to the death registration area to 1936.

In addition to the analysis of the mortality records, a study has been initiated to determine the morbidity from cancer. A schedule is sent to every physician, hospital and clinic in selected areas throughout the country requesting certain information concerning all patients who were seen or treated for cancer during the calendar year 1937. Visits are made to every person, who does not return the schedule, in order to obtain a complete record of all cases of known cancer. This study has been completed in Atlanta, Ga. and is now under way in Cook County, Ill., Allegheny County, Pa. and Wayne County, Mich. It is contemplated that the work will be extended to additional cities in other parts of the country.

An intensive study of the social, economic and medical factors associated with the development of cancer, is being carried on in Memorial Hospital, New York City. A detailed life-history form, embodying the hypotheses of leading authorities, concerning the factors which predispose to cancer, has been prepared and is being filled out by personal interview of persons attending the clinic in Memorial Hospital. In addition to the information contained in this form, each patient is given a thorough physical examination. A similar procedure is followed for patients who do not have cancer in order to obtain a control group. A considerable amount of preliminary experimentation has been necessary in order to develop a valid and reliable method of taking personal history which can be analyzed statistically.

American Association of Schools of Social Work

The Social Science Division of the Rockefeller Foundation has made a grant to the American Association of Schools of Social Work for a three-year study of the present curricula and plans of schools of social work and changes required for meeting the new demands for trained personnel in the state and federal Social Security programs. The study will be directed by the Executive Committee of the Association which consists of Wilbur I. Newstetter, Western Reserve University, President of the Association and Chairman of the Executive Committee; Marion Hathway, University of Pittsburgh, Secretary-Treasurer; Arlien Johnson, University of Washington; Margaret Leal, New York School of Social Work; Alice Leahy Shea, University of Minnesota; R. Clyde White, University of Chicago; and Elizabeth Wisner, Tulane University. In the study consideration will be given in particular to training required for students going into case work, administration, statistics and research in the public social services. Effective June 1 Miss Hathway will become full-time Executive Secretary of the Association.

Brookings Institution

In *Income and Economic Progress*, published by the Brookings Institution in 1935, it was suggested that there is "one type of distributive reform which in our judgment outranks all others in its promise of attaining the goal we seek"—namely "the gradual but persistent revamping of price policy so as to pass on the benefits of technological progress and rising productivity to all the population in their role of consumers." In further development of this subject a volume on *Price Policies and Economic Progress* shortly to be issued, will deal on the one hand with the obstacles, and on the other with the nature and extent of the practical progress which has been made towards the realization of this objective.

A translation and adaptation of Siegfried von Ciriacy-Wantrup's *Agrarkrisen und Stockungsspannen* has been prepared by Charles O. Hardy, and will be published by the Institution within a few months. This book is a historical description and theoretical analysis of the long cycles of prices and production of the nineteenth and twentieth centuries, with special reference to agriculture. On May 20 and 21 an invitation conference on the long cycle, sponsored by the Social Science Research Council was held at the Brookings Institution. A preliminary draft of the translation was laid before the Conference for discussion.

Research Projects at Dun & Bradstreet, Inc.

Survey of Wholesalers' Operating Costs. Four wholesale trades are being covered: Liquor, Automotive Parts and Accessories, Dry Goods and Paint. No general broadcast invitation was extended to wholesalers' associations in connection with this Survey, since it was necessary to focus on the Business Trend Survey as large a part of the energy of the staff as possible. The analyses of these operating statements from wholesalers are expected to be

published some time during the summer. Because the type of analysis attempted experimentally last year was so well received, increased attention will be given to grouping the houses according to method of operation, as measured by major customer groups and important commodity lines in their sales volume.

These analyses will continue the breakdown tried experimentally last year, classifying concerns in three groups according to profit status: successful, survival and unprofitable. The successful concern is defined as one which is earning a rate of return on its net worth sufficient to attract additional capital. Survival concerns are the intermediate group earning less than a desirable return on net worth, but able to continue in business indefinitely while showing some profit.

Business Trend Survey. The preliminary report, giving trends of sales, inventories and receivables for over 100 lines of industry and trade was published in the March issue of *Dun's Review* and distributed widely in the form of a special reprint. The preliminary report included figures from over 17,000 concerns with an aggregate sales volume of more than $11 billion. This was better than 10 per cent of the total business transactions in the general area of manufacturing and trade covered by the Survey.

The first two sections of the final report will appear in the May issue of *Dun's Review.* They will be based on usable returns from over 28,000 concerns (out of more than 42,000 received), and the aggregate sales volume reported by the sample will total over $22 billion.

In building up the estimated sales and inventory figures for 1937 each industry has been given its proper census weight, both in the preliminary and final computations. In addition, the final computation attempts the experiment of weighting the trend percentages for each size of concern according to the census breakdown, within that trade. In the field of manufacturing, where no size breakdown is available from the census, estimates of the proportion of volume by size groups were compiled from Treasury income statistics and other sources.

Along with permitting dollar estimates of inventories at the end of 1937, and sales for the years 1936 and 1937, the Survey has yielded some unusually complete figures on credit policies and experience. It has been possible to estimate the cash credit and instalment breakdown by trades for 1935, 1936 and 1937 and to show the trends of credit policies from year to year, both by dollar volume and by number of concerns.

The two final sections, expected to follow in the June and July issues of *Dun's Review,* will deal with expenditures of business concerns for additions and improvements during the past two years, and case studies of the differences in business trends which appear to be related to the size of the concern.

Dividend Policies during the Depression. An analysis of the related profits-and-dividends performance of corporations during the depression and recovery period, 1929 to 1935, was presented in the April, 1938 issue of *Dun's Review.* The aim was to discover, not merely what profits did, or what

dividends did, but particularly what they did together as corporate fortunes sank and recovered during those tense and significant years.

Because the records of 348 identical corporations are traced over the 7-year period, the data tell an inside story of corporate behavior of which the usual aggregate computations give only occasional glimpses. Analysis was also possible of the profit-making abilities and dividend-paying propensities of the various industry groups and size classes. The picture is drawn from the confidential information submitted last year by several hundred corporations in connection with the Dun & Bradstreet study of the effects of the Undistributed Profits Tax.

National Bureau of Economic Research

At its meeting in December the Universities-National Bureau Committee, which initiated the cooperative program of the National Bureau in 1935, agreed that the results of the two-year experimental period amply justified the continuation of the program and pointed the way for its further development. They laid down two essentials for effective work: (1) A scheme of organization that will assure for the program the continuation of disinterested guidance and the widest possible collaboration and support. There must be some going concern that can sponsor projects and provide, when desirable, for the publication of reports. (2) A center with an adequate staff and equipment for conferences, the assembling and storage of research materials, and accommodation for collaborators from a distance. To fulfill the first of these requirements they recommended that the relationship between the University representatives and the National Bureau be made closer in order to increase the extent and effectiveness of University participation in the planning and conduct of the National Bureau's work. At their annual meeting on February 7 the Directors of the National Bureau accepted the recommendations of the Universities-National Bureau Committee that it become a committee of the National Bureau, to be called the Committee on Cooperative Research, and that three Directors by University Appointment be added to the Board.

The annual meeting of the Conference on Research in National Income and Wealth on April 1 and 2 was attended by more than 50 persons. The results accruing from the stimulation of work by individual students have been so valuable that it decided to continue this line of activity. A list of problems that seem to demand and be susceptible of treatment by individual students will be drawn up in the hope that persons competent and in a position to undertake analyses can be found.

The papers presented at the April meeting were: "Problems in Estimating National Income arising from Production by Government," by G. C. Means (National Resources Committee); "The Correction of Wealth and Income Estimate for Price Changes," by M. A. Copeland and E. M. Martin (Central Statistical Board); "On the Measurement of National Wealth," by Simon Kuznets; "Allocation of Benefits from Governmental Expenditures," by R. W. Nelson and Donald Jackson (Department of Agriculture).

Those presented at Atlantic City under the auspices of the American Economic and Statistical Associations were: "National Income, Savings, and Investment," by Gottfried Haberler (Harvard University); "Capital Gains in Income Theory and Taxation Policy," by W. W. Hewett and Roy Blough (University of Cincinnati); "The Distribution of Family Incomes as Revealed by the Financial Survey of Urban Housing," by D. L. Wickens.

These seven papers, together with the discussion to which they gave rise, will soon be submitted to the Directors of the National Bureau for publication as Volume II of *Studies in Income and Wealth*.

The tabulation of the Wisconsin income tax returns for 1936 is virtually completed. The State plans to publish the results in several volumes, the first of which is now in press. In Delaware complete tabulation of the individual income tax returns for 1936 has been started. Punching has been completed and it is hoped that the detailed tabulation will be finished by the end of the summer.

One of the more extensive enterprises contemplated for the future is a survey of the available data on the distribution of income and wealth by size among individuals and families. It is proposed to conduct this survey by requesting the people closely associated and familiar with the various bodies of data in this field to submit brief reports on the character of such data, these reports taking into consideration questions that will be submitted to the reporters by a special committee of the Conference appointed to conduct the survey. This committee may attempt to summarize the results of the survey and indicate, if possible, the standards that it would be desirable to maintain in the future in the collection of any information intended to bear upon the distribution of income and wealth by size.

The Executive Committee of the Conference for 1938–39 comprises: Simon Kuznets, Chairman, M. A. Copeland (Central Statistical Board), H. M. Groves (University of Wisconsin), M. W. Hewett (University of Cincinnati), Hildegarde Kneeland (National Resources Committee), R. R. Nathan (United States Bureau of Foreign and Domestic Commerce), O. C. Stine, (United States Bureau of Agricultural Economics), Milton Friedman, Secretary.

The Conference on Price Research, meeting at "Hillside" on April 8 and 9, was attended by 30 persons. The Conference endorsed a proposal of the Executive Committee that standing committees be made responsible for the promotion of cooperative research in special fields—the coal industry, the relation of costs and prices, and the problems of price control. Joel Dean, of the Economics Department of the University of Indiana and recently of McKinsey, Wellington and Company, has been made Executive Secretary with special duties in connection with the work of standing committees on research. The Executive Committee for 1938–39 consists of: F. C. Mills, Chairman, Anne Bezanson (University of Pennsylvania), M. A. Copeland (Central Statistical Board), E. S. Mason (Harvard University), Henry Schultz (University of Chicago), O. C. Stine (Bureau of Agricultural Economics), Willard Thorp (Dun and Bradstreet), C. L. Lee, Secretary.

National Industrial Conference Board

In the field of personnel administration the Board has continued its studies of special questions primarily by use of the questionnaire method. Information received from nearly five hundred companies is tabulated in its study of "Curtailment, Lay-Off Policy and Seniority." Detailed tables show how curtailment was effected and its approximate extent. Separate figures are given for companies that have agreements in one form or another with labor unions and those that have not. A study of "Profit-Sharing Plans for Executives" reports the experience of upwards of one hundred companies. An extended tabular statement gives the essential features of 54 different plans. These plans vary with the type of persons who participate, the method of computing the share of the profits and the method of payment. A further publication in the *Studies in Personnel Policy* deals with "Assuring Employment or Income to Wage Earners—A Case Study." It deals with the details of seven active and four discontinued plans. Further studies in this field relating to health insurance, company public relations, and employee rating systems are under way.

The Board's study of "Differentials in Industrial Wages and Hours in the United States" is an exhaustive analysis of average weekly and average hourly earnings and average hours of work per week in the following industries: cotton, foundries and machine shops, furniture, lumber, printing, electricity, gas, and paper and pulp. Averages are computed for geographic regions and states, for population groups, and within each industry for specific occupations in the different geographic areas.

The Board has recently issued a compilation of "Current Wages in Manufacturing Industries in Foreign Countries" and is assembling the results of its regular monthly inquiries regarding the cost of living and employment, hours, and earnings in manufacturing industries for the period July 1936 to December 1937, to be published shortly.

The first fruits of the Board's study of conditions in Russia were published in a brief exposition of the "Purchasing Power of Wages in the Soviet Union," bringing hitherto unpublished information regarding retail prices in that country. Discussions of "American Enterprises—Number and Size," "Depression and Recovery in the United States and Canada," and an analysis of "The Farm Control Act of 1938" complete the list of publications recently issued. The Board is engaged in further studies of national income in the Nineteenth Century, the distribution of income by size classes, estimates of national wealth, and wholesale price changes.

CHAPTER ACTIVITIES

The Albany Chapter

A meeting of the Chapter was held on February 28, 1938, at the Candle Light Inn in Albany for dinner and program. Mr. F. J. Decker, President of the Chapter, presided. Thirty-nine members and guests were present. Dr. Theodore H. Brown, Professor of Business Statistics of the Graduate School of Business Administration, Harvard University, was the speaker. His topic was "The Business Man's Use of Statistical Methods."

The Austin, Texas Chapter

On October 28, 1937, the Chapter held its first meeting for the current year. A paper entitled "The Recent Stock Market Decline and Its Effect on Business" was read by Mr. J. E. Hodges, Instructor in Business Administration, The University of Texas. Mr. Hodges first reviewed the recovery forces in effect up through the early part of 1937. This was followed by a description of business and stock market activity from the first of 1937 through the sharp decline of the market on October 19. The probable causes of the rapid market decline were also discussed.

In conclusion, the speaker stated that business was beginning a serious decline which was gathering momentum and that the recession would likely continue until the fall of 1938. The long term outlook for business was held to be favorable but complete and sustained recovery could be achieved only by a revival of the long dormant building industry and a general increase in the standard of living of the average worker.

A paper entitled "Censuses of Motor Vehicle Traffic," presented by Dr. C. W. Vickery, Chief Statistician of the Texas Highway Planning Survey, was the chief item on the program of a meeting of the Austin Chapter held December 18, 1937.

Dr. Vickery discussed methods of sampling, as well as methods of statistical analysis, in use in the Texas Highway Planning Survey conducted by the Texas Highway Department, in cooperation with the United States Bureau of Public Roads.

Two fundamentally different sampling methods are being employed to determine the amount of use of the various roads and road systems in the State. One of these methods involves the counting and classification of vehicles as they pass designated stations on the highways. The other method involves the obtaining from a representative sample of motor vehicle owners a detailed description of the trips made by each over a period of a year. A third method, which is a hybrid of the two, involves the counting of all vehicles and the securing of brief interviews from a representative sample at certain stations on the county roads.

Methods used for the seasonal correction of traffic counts were presented. The patterns of seasonal variation are determined from control stations at which a number of seasonally spaced counts are secured. Composite indexes

are prepared from a group of similar stations and employed for the seasonal correction of counts secured at stations where only a single count is made. The possibility of constructing a traffic flow map for the State Highway System from the data secured by the interview method was discussed, as well as the possibility of estimating the Traffic Potential between any two points on the highway system. A method developed for the analysis of the hybrid type of survey known as Extensional Analysis was also discussed.

The Austin Chapter held its third meeting of the year on February 21, 1938. Dr. J. C. Dolley, Professor of Banking and Finance, The University of Texas, was the principal speaker. His address was entitled "A Statistical Study of Some of the Effects of Securities Exchange Regulation."

Dr. Dolley's discussion followed closely the outline of his paper entitled, "Government Regulation of Stock Trading," which was published in the *American Economic Review*, issue of March, 1938.

The purpose of this study was to determine the effect that government regulations have had upon the stock-trading volume and liquidity of the national security markets. The study was confined to the New York Stock Exchange.

Dr. Dolley discussed the extent of government regulation over stock trading, devoting particular attention to margin regulations, the recent trend in volume of stock trading and market continuity, and the trend in volume of stock-exchange member trading. He presented tables and graphs showing the average daily reported volume of stock transactions from January, 1934, through October, 1937, the average number of shares traded per point of change in the Dow-Jones average of 70 stock prices for the same months, the average number of shares traded per point of change in market price of nine active stocks for the month of May, 1934, 1935, 1936, and 1937, average spreads in bid-ask quotations on a sample of several common stocks for May, 1935, and May, 1937, and the trends in absolute and relative volumes of round-lot and odd-lot transactions initiated on the floor and off the floor by members of the exchange, by specialists and by odd-lot dealers, from June 22, 1935 to October 16, 1937.

Among the conclusions drawn by Dr. Dolley, it was stated that, "During the past two and one-half years, the New York Stock Exchange has become a markedly more discontinuous market for stocks. With a general trend toward declining trading volume, stock prices have shown an increasing tendency toward wider spreads from sale to sale and wider ranges in bid-ask quotations."

It was shown that trading both by the outside public and by stock-exchange members diminished noticeably in volume during the period studied, with member trading for own account declining relatively more than public trading, and with floor trading most affected. The volume of transactions initiated both by the outside public and by exchange members declined sharply following imposition of higher margin requirements, indicating that those regulations have had the greatest effect on trading volume.

Dr. Dolley pointed out that, "It would seem that of the traders who have retired partially or wholly to the side-lines, more are professionals than amateurs. In the long run, the market activities of the former group are more likely to keep prices in line with sound values than amateur trading which is based largely on chance information and which is more easily affected by mob psychology."

Dr. Dolley suggested that while government regulations have encouraged the small investor in common stocks, the declining speculative trade is resulting in a less continuous market and in correspondingly less liquid stocks. The markets have become less able to absorb heavy liquidation, and the danger of collapsing price declines have increased. It has become more difficult and expensive to raise new capital funds through the flotation of stock and bond issues, and business expansion has been retarded accordingly. It was suggested that modifications be effected where necessary so as to provide the desired protection to the public with a minimum of injury to the liquidity and efficiency of the security markets.

The Chicago Chapter

The program subject of the fourth meeting of the season, February 15, was *Public Utilities*. Dr. Paul J. Raver, Executive Officer of the Illinois Commerce Commission, discussed "Trends in Public Utility Regulation." In concluding his discussion of regulatory policies, Dr. Raver said he believed that public utility companies should cooperate with commissions in arriving at some agreed basis for rates; that insofar as government enters the field as a competitor, such competition should be reasonably conducted and with regard for the investment of private companies; and that commissions and utilities must realize that their first responsibility is to the consumer. An analysis of "Current Problems in Public Utility Valuation" was made by Dr. Willard J. Graham, Professor of Accounting at the University of Chicago. Professor Graham discussed various accounting phases of public utility valuation and rate making. Professor Wilber J. Katz, Professor of Law of the University of Chicago, commented briefly on some of the points brought out by the speakers, and there was general discussion from the floor on the various problems involved in determining a basis for rate making. The attendance at this meeting was 98.

"Problems of Economic Planning" constituted the topic for the meeting held April 12. Mr. George E. Putnam, consulting economist of Swift and Company, spoke on "The Background of Planning." After stating that economic planning is not new to the United States, he reviewed previous examples of government planning in this country. "The Prospects for Planning" were discussed by Professor Harry D. Gideonse, Associate Professor of Economics of the University of Chicago. Professor Gideonse was of the opinion that the present tendency among businessmen to form organized groups is one indication that free enterprise is on the way out. He felt that the future of planning was a question of the conditions of intellectual freedom and the values placed on them. The program concluded with comments

by Howard J. Stover, Statistician, The Farm Foundation, Chicago, and Professor Fred E. Clark, Director of the Graduate Division of the School of Commerce, Northwestern University.

The Cincinnati Chapter

At a meeting of the Chapter on March 10, 1938, H. Carl Frantz, Personnel Research Department, Procter and Gamble Company, discussed the mathematics of life insurance under the title of "Life Insurance: You Get What You Pay For." The following officers were elected: President, W. A. Baude, University of Cincinnati; Vice-President, Elmer B. Royer, Industrial Relations Department, Procter and Gamble Company; Secretary, Douglas E. Scates, Cincinnati Public Schools.

Edgar Z. Palmer of the Bureau of Business Research of the University of Kentucky spoke on "The Effect of the Flood upon the Employment and Payrolls in Kentucky" at a meeting of the Chapter on April 21.

The Cleveland Chapter

On February 28, Mr. Howard Whipple Green addressed the Business Statistics Section of the Cleveland Chapter on "An Analysis of Election Returns." The talk was based on a study which dealt particularly with welfare levies in Cuyahoga County. The trends in the results of successive elections were studied by precincts and the effect of various factors such as the size of the vote, and the submission of other issues were noted. Mr. Green used some very effective shaded maps to illustrate the talk.

On March 21, the Group was addressed by Mr. Weisman, columnist for the Cleveland *Plain Dealer*, on the current economic outlook. Mr. Weisman spoke largely on the subject of capital and its use at the present time, raising the question whether at present the world is using its capital at a more rapid rate than it is being produced.

The speaker stated that there has been only a small volume of new corporate security issues floated during the past five years. The blame has been placed by many on the Security Exchange Commission and on the tax laws. The opinion is widely held that there is a log jam in the capital markets waiting for favorable action on the part of Washington to be released. Mr. Weisman wonders whether the trouble in the capital markets is not more deepseated than is generally supposed, whether there is really a plethora of funds waiting for investment opportunities.

The speaker reviewed the source of new capital funds. There is, first, the capital created by the savings of small investors, which was such an important source of the capital raised in the pioneer days in this country. Savings by small investors have been discouraged by bank failures in the early part of this decade, by the fear of inflation, by low interest rates on savings accounts and by real estate losses. He states that the increase in savings accounts at mutual savings banks has been less than that which would have been created by the accumulated interest. The attitude is more generally to eat, drink and be merry.

The second source of new capital is corporate thrift. This has been discouraged by the excess profits tax, which has encouraged corporations to distribute too large a portion of their earnings in dividends. Corporate thrift was the basis of the tremendous growth of companies such as The Ford Motor Company.

The third source is capital under the control of wealthy individuals. High inheritance, capital gains and surtax rates have discouraged those individuals from investing their capital in productive enterprise. Instead, they buy tax-free government securities. Too large a portion of capital funds are invested in "trustee" securities.

Mr. Weisman spoke briefly of the railroads. It was stated that they have eaten up their substance. They have lived on the accumulations of previous generations. Their plant and equipment have deteriorated. The question was submitted whether during the past five years we have borrowed on the future and lived on past substance to create a temporary prosperity. If so, how far can we go to draw out this hiding capital?

Mr. Weisman is wary of short answers, but he thinks that favorable tax laws passed before the adjournment of Congress might prove to be a considerable help by autumn. He believes that we can experience no marked improvement in the economic situation until private capital flows in larger quantities into productive enterprise. Prosperity is not created by ordinary replacement demands. The expansion of old enterprises and the creation of new undertakings are necessary to the development of healthy economic conditions. He doubts that a new outpouring of federal funds would be a satisfactory substitute for an expansion in the investment of private capital in productive projects.

The Connecticut Chapter

The annual meeting of the Connecticut Chapter was held at the Faculty Club, New Haven, March 15, 1938. Professor Burton H. Camp of Wesleyan University spoke on "Small Sample Theory—Some Critical Remarks."

The following officers were elected: President, Dr. Dorothy S. Thomas, Director of Research in Social Sciences, Institute of Human Relations, Yale University; Vice-President, Professor Underhill Moore, Yale University; Secretary-Treasurer, Louis M. Nichols, Comptroller, G. E. Supply Corporation; Members of the Executive Committee, Professor Frank Shuttleworth, Institute of Human Relations, Yale University, and Mr. H. Daniel Darling, Research Assistant, Connecticut State Labor Department.

The Lehigh Valley Statistical Society

A highly successful dinner meeting of the society was held on February 16. Twenty-five men attended. Mr. Henry W. Van Pelt, director of the Bureau of Statistics of the Commonwealth of Pennsylvania, spoke on "Condensed Graphs for the Guidance of Management." He described the recent suggestions for plotting internal statistics in a simple, effective way for the use of department heads and higher executives. He singled out for detailed analysis

the variable budget and charts depicting breakeven points. Mr. Van Pelt expressed the opinion that, in the future, much more attention would be given to this kind of statistical analysis. Mr. Frank W. Ziegler, assistant to Mr. Van Pelt, and in direct charge of the Pennsylvania Census of Productive Industries, accompanied Mr. Van Pelt. He spoke briefly on the function of the Pennsylvania Census.

The New York District Chapter

A meeting of the New York District Chapter was held on March 1, 1938. The general topic was "Capital and the Security Market." F. Leslie Hayford of General Motors Corporation presided.

The first speaker was J. H. Riddle of the Bankers Trust Company who spoke on "Bank Capital and Credit Expansion." The argument which Mr. Riddle sought to develop concerned the influence, if any, of the volume of bank capital upon the expansion in bank credit. His studies led him to the conclusion that the actual level of the capital funds of domestic banks at no time had tended to limit to any noticeable degree the extent of the credits which they were willing to make available to business.

For years, it has been traditional among bankers to accept a ratio between bank deposits and capital funds of about 10 to 1, as a proper and conservative limit to the expansion of bank credit. Actually however, past banking experience has shown the ratio of deposits to capital usually remained far below this level. On June 30, 1937, the ratio was not higher than 6.7 to 1, and is now presumably even lower, due to the contraction in bank loans and deposits this winter. In fact, an expansion in domestic bank credit of nearly $21,000,000,000 could be witnessed on the present volume of capital funds without exceeding the traditional limit of 10 to 1. Even if all of the capital provided by the Reconstruction Finance Corporation to the banks were deducted from total bank capital funds, the extent of domestic bank credit expansion that would be possible within the limits of a 10 to 1 ratio would still be $15,000,000,000 above present levels.

Before the present century, while our American bank system was still relatively undeveloped, the ratio of credit to capital was extremely low. In the year 1874, total deposits outstanding were actually less than the banks' total capital funds. With an almost continuous rise in subsequent years in both deposits and the volume of bank credit, by 1900 the total of capital funds represented about 40% of total bank deposits, and by 1937 was down to only 13%. Expressed in the more usual way, the ratio of deposits to capital in 1937 had risen to more than 7½ to 1, from a ratio of less than 1 to 1 in 1874. Of course in considering the whole question of the limitations on bank credit expansion, it might be useful to examine the relationship of capital funds not only to deposits but also to bank note issues as well, wherever banks in past decades had their own note issues in circulation. However, even a long term study of the ratio between bank deposits and bank notes combined and the size of capital funds will reveal the same steady downward trend in the amount of bank capital considered necessary to support the

banks' credit structure. But seldom was the volume of bank credit anywhere near as high relative to the size of capital funds as the traditional 10 to 1 ratio.

The dominant influence governing the expansion or contraction in bank credit is after all simply general business demand for loans. Fluctuations in the volume of bank credit are traceable mainly to spontaneous economic causes, having little connection with academic ratios of capital to deposits. The existing level of bank capital is as little responsible for changes in the volume of business loans as it is for the interest rate charged on these loans. If any proof is needed of the relative insignificance of bank capital as the determining factor in the growth or contraction of credit, it is clearly found in a study during 1937 of two groups of representative domestic banks; the one group at the start of the year having a high ratio of deposits to capital (i.e., operating on a "thin equity"), the other group having a low ratio. It might have been supposed that the group operating on the thinnest margin would have been inclined to reduce its deposits more rapidly during the deflationary period of 1937 when all bank deposits were contracting steadily. On the contrary, the statistical analysis revealed this group with relatively low capital funds experienced a *smaller* decline in total deposits than the group having relatively large capital funds. In seeking an explanation for this phenomenon, it would seem probable that the banks with more limited capital felt a greater necessity to secure as large an income as possible by the full employment of all available funds in loans and investments, as the only means of ultimately increasing their capital. In other words, in this instance limited capital proved a cause for *not* adopting conservative policies and curtailing the volume of credit in times of uncertainty and deflation. About the only safe generalization regarding the influence of the relative size of capital funds on banking policy is the statement that the lower the available capital, the higher the degree of risk the banks seem prepared to take.

To conclude: In the coming year we need not expect the extent of bank lending to be limited by the amount of bank capital nor fear that banks will be persuaded to curtail further their deposits due to low capital funds, so long as they still possess *excess reserves*. All important, indeed almost the sole balance sheet factor determining the probable future course of bank credit, is the volume of excess reserves. Any early rise in business demands for credit is not likely to cause a corresponding liquidation of bank investments. No important reduction in investments is likely until the Federal Government at last attempts to reduce significantly its present deficits and actually starts to retire some of its present outstanding obligations (which of course in large measure are in the hands of the banks).

The second speaker was James F. Hughes of Smith, Barney and Company who spoke on "Bank Credit as a Forecaster of Business Trends." Mr. Hughes has undertaken a long term analysis of the relationship between the volume of bank investments, and the condition of the security markets. Ten years ago, he had believed that the level of interest rates represented one of the important factors in forecasting coming security market trends. He had

also observed that the major part of bull markets was usually witnessed during the period that business was below normal; the major part of bear markets while business activity was above normal. The most logical explanation for this phenomenon appeared to be that in past decades the final stages of expanding business activity found credit demands on the banks at a maximum, thus encouraging a liquidation of funds invested in securities, i.e., a withdrawal of support from the security markets, in order to meet this rising demand for business loans. On the other hand, during periods when business was below normal, and demands for loans therefore at a minimum, an increasingly large volume of idle bank funds became available for investment in securities. However, the last decade has seen an apparent collapse in this old and well-established correlation between interest rates and the investment market on the one hand and business activity on the other.

In the depression of 1929–32 for the first time we saw a persistent drop in business activity below normal accompanied by a level of security values well below normal. Then came the New Deal with its unique economic philosophies to insure a complete upset of the old traditional relationship between interest rates and business trends. Thereafter, the level of interest rates seems to have been of little use as an indicator of business prospects. A substitute in banking statistics had to be found if possible. The fluctuations in the banks' investment account appear to be the answer. Most other bank figures studied only synchronize with business fluctuations—do not forecast changes in business trends. But a careful examination of the ups and downs of bank investments establishes them as an excellent forecaster of business trends. The year 1919 provides a good example. In May, 1919, a five year rise in the banks' investment account was noted, followed by a sharp drop to July 1921 amounting to $1,700,000,000. This represented a decline in that relatively short space of time of nearly 35%. The actual peak in the stock market, it will be remembered, was November 1919. It is interesting to note that business loans of the banks in 1919 continued to rise for quite some time after the downturn in their investments, which started in May of that year. Again it may be observed that the significant turning point in the long up-trend in bank investments during the "20's," was witnessed in June 1928. There followed a sharp decline in investments, accompanied by a continued rise in loans, through to the latter part of 1929. And lastly, it is a matter of note that a significant down-turn in bank investments, before our most recent market collapse, had already begun before the end of 1936. In the four major security market collapses of the 20th century, i.e. 1907, 1919, 1929, 1937, we were well forewarned by the same sequence of events, a down-turn in bank investments accompanied by a continued rise in loans for many months thereafter. Preceding the last collapse, that of 1937, we witnessed the greatest liquidation in bank investments in history, a drop of $2,200,000,000, while during a major part of this liquidation business loans were still rising.

Thus, the course of bank investments has furnished conclusive signals to past bear markets. The value of such studies in timing bull markets is some-

what obscured by the generally upward long-term trend in bank investments. There have been periods when a rise in bank investments for some months has not signalled any important advance in the security markets. However, a careful examination of changes in bank investments has proved profitable in the study of bull markets as well.

The third speaker was Donald Woodward of Moody's Investor Service. His subject was "Some Problems of Capital Financing." One of the important considerations in studying the economic developments of the past five years has undoubtedly been the financing of gross capital formation by business. During this period from 1932 through 1936, the principal source of such capital financing was the working capital of corporations themselves. The liquid reserves of our major corporations were drawn on heavily not only for the purpose of reducing bank loans and floating indebtedness, but also for financing additions to capital assets, i.e., plant an equipment. Despite a sharp rise in these years in capital outlays, funds from the capital markets were either unnecessary or inaccessible to most corporations. So severe was the resulting drain on corporate funds that the working capital and cash position of domestic industry at the end of 1936 was the lowest in more than a decade. This method of financing was obviously economically unsatisfactory. Moreover it has led to a condition where resort to a properly functioning capital market is essential if any significant further improvement in capital outlays by business—which means normal activity in the durable goods industries—is to be witnessed in the coming years.

What are the usual sources of supply upon which the capital markets depend? They may be identified briefly as either individual domestic savings, importations of foreign capital, direct bank credit, or in more recent years particularly, government credit. To what extent has the total volume of funds available to the capital markets been affected by economic developments in the last five years? The quantity of individual savings does not appear to have been noticeably impaired. But a sharp curtailment has been experienced in the influx of foreign capital, which promises to remain restricted for some time, and in the volume of corporate savings, where further accumulations are now discouraged by the undistributed profits tax. Government credit remains an important but uncertain factor. Therefore, bank credit, as a source of capital financing has become in the past twenty years an increasingly important factor in influencing the conditions of capital formation and the status of the investment markets.

How adequate then are these banking resources likely to prove in making possible the necessary capital financing of domestic industry in coming years. Doubt is expressed that the present size of capital funds will *not* prove a somewhat limiting factor in the future expansion of bank credit, if for no other than psychological reasons, partly induced by the recent marked instability shown by bond prices. There may be little evident change in the total *quantity* of bank credit now available but there has been a real change in the recent years in the *quality*, or character, of bank credit available which will serve to restrict future expansion. In this regard, attention is called to

the increasing institutionalization of savings funds in this country, i.e., the passing of control of savings from private individuals into the hands of insurance companies, trust funds, investment trusts, etc. Characteristically institutional investors will hazard less in financing industrial developments than private investors. Moreover there has been a steady trend toward other restrictive government regulation over the operations of these savings institutions which also serves to curtail qualitatively their lending capacity. Also the extremely high present level of the bond market, unwisely supported by the extreme easy money policies of the government, will undoubtedly tend to discourage rapid expansion in bank credit from here on. The possible depreciation in principal value to which new investments at these high market levels are exposed is a very real hazard to the average banker.

The above considerations lead inevitably to the conclusion that the essential expansion in the capital markets so necessary to financing any important further increase in capital goods outlays is likely to be restricted by many factors. There appears to have been a real curtailment in the total available capital funds qualitatively if not quantitatively, which will play an important role in future financial developments. This curtailment may not necessarily serve to obstruct an early recovery in business activity from the existing extremely depressed levels, but after a more normal level of activity has been restored, its restrictive effect may become much more noticeable.

The final speaker was Ragnar D. Naess of the Tri-Continental Corporation who discussed "The Flow of Capital and the Security Market." He expressed a recognition of the basic importance of the capital markets to business development, the rate of reinvestment of savings funds as a controlling influence on business prosperity. It is clearly evident that until recently business expansion had been far less dependent upon funds from capital markets than is now the case with corporate working capital so greatly impaired. Yet the opportunity for securing an adequate supply of capital funds from a freely functioning security market is more limited than ever before. The capital market is hemmed in with government interferences while artificially easy money, without any active demand for money, has been created by the government's financial policies. The 1933–1936 business recovery was engineered by the triple government barrage of: (1) devaluation, (2) N.R.A. monopolistic controls, and (3) Government spending. The inevitable result was an excessive, artificial demand in the consumers goods industries. The subsequent expansion in the durable goods industries was long delayed and was made possible only through the exhaustion of corporate working capital. Today, therefore, we are faced with still high inventories, depleted cash reserves, and withdrawal by the government from its earlier inflationary policies on which business recovery was largely based. With this background, there is no clear prospect of any material improvement for at least six months in either the capital markets or general business activity.

CHARLES B. LOCKWOOD

The Philadelphia Chapter

A meeting of the Philadelphia Chapter was held on March 18, 1938 at the Manufacturers' and Bankers' Club in Philadelphia. Dr. Simon Kuznets of the National Bureau of Economic Research and the University of Pennsylvania spoke on "The Measurement of Capital Formation" and Dr. Gerhard Colm of the New School of Social Research discussed "Capital Formation and Taxation."

The Pittsburgh Chapter

The February meeting of the Pittsburgh Chapter was devoted to a discussion of the problems associated with the computation of local electric and telephone rates. This discussion was led by R. E. Caywood, Rate Engineer, West Penn Power Company, and E. W. Ortolf, Rate Engineer, Bell Telephone Company of Pennsylvania. The presentation was followed by considerable discussion as to the nature of local conditions which govern utility rate structures. The way in which the topography of Allegheny County exercises a very decisive factor in the determination of gas and electric rates was explained. Mr. Ortolf emphasized the experimentation with the local demand for telephone service which enters into the empirical determination of telephone rates.

"Some Thoughts About Industrial Development" was the topic for the March meeting. The discussion was led by Mr. Walter H. Kelley, Manager of the Industrial Development Department of the West Penn Power Company. Emphasis was placed upon the fact that the primary need of industry today was the agreement upon some stable program.

The San Francisco Chapter

Professor N. J. Silberling, Graduate School of Business of Stanford University, addressed the Chapter at a meeting on January 20, 1938 on the "Outlook for Housing Construction and Its Financing Aspect." He pointed out that the importance of housing construction as a factor in the general economic situation has not been sufficiently recognized nor has it been observed with an adequate background of statistical information. The building industry as a whole (of which housing construction is a large part) is the most important single factor in the major fluctuations of the business cycle. Many major factors impinge upon the building industry from without, such as war, inflation, and population movements. The effects of these external factors are often continued over a period of years.

Citing Riggleman's index numbers, Professor Silberling traced the tremendous fluctuations which have occurred during the last century, all with their effects on manufacturing and extractive industries.

Roughly half of the American population lives in houses owned by their occupants but a Federal survey of 52 cities in 1934 showed that 58 per cent of the owner occupied homes were mortgaged. The 17 billion dollars of mortgage debt is the largest single classification of long-term debt in this country and equals the combined long-term debt of all railways and industrial

concerns. There is a great lack of statistical information about the financing of building. Construction is highly speculative and a good many of the financial troubles have their origin in the conditions surrounding the initial construction of structures. Lending institutions have been very conservative with the result that would-be home owners have sought second and third mortgages. Efforts are now being made to eliminate second and third mortgages and to insure mortgages. Careful supervision of the whole process is necessary for sound financing. There is also a tendency toward housing construction on a big scale. Recognition on the part of the investor-builder of the fact that most people are and always will be renters, will foster a policy of substantial building to provide permanent homes without waves of foreclosure and violent alternatives of employment and unemployment.

Dr. Evelyn Aylesworth, Supervision Statistician, California Forest and Range Experiment Station at Berkeley, spoke to the Chapter on "Dr. R. A. Fisher's Approach in Statistical Methodology" at its meeting on March 3, 1938. Following the development of the subject from Dr. Fisher's *Design of Experiment* but with additional examples from her own observations, the speaker outlined the logical principles of experimentation and discussed the design of experiments which satisfy these logical principles. The necessity of designing an experiment so that it will yield a valid test of significance, the desirability of replication, the use of experimental controls and randomization were discussed. Among the experimental devices which were considered in detail were pairing, grouping, factorial design and confounding.

The Washington Statistical Society

A meeting of the Washington Statistical Society was held on February 28, 1938 to discuss the desirability of revising the base periods for government index numbers. A summary of the discussion is presented as a separate note on page 411 of this issue of the JOURNAL.

The Chapter met on March 29, 1938 for a program of discussion on "Key Factors in the Current Business Situation." The principal participants were Ernest M. Fisher of the Federal Housing Administration, R. W. Goldschmidt of the Securities and Exchange Commission, Chandler Morse of the Board of Governors of the Federal Reserve System, Robert Nathan of the Bureau of Foreign and Domestic Commerce, and F. L. Thomsen of the Bureau of Agricultural Economics.

The annual meeting of the Chapter was held on April 26, 1938. The following officers were elected: President, Halbert L. Dunn, Bureau of the Census; Vice-President, O. E. Kiessling, Bureau of Mines; Secretary-Treasurer, Thomas B. Rhodes, Works Progress Administration. The subject for the evening's discussion was "Are We Progressing Toward a Standardized Concept of National Income?" A. D. H. Kaplan of the United States Bureau of Labor Statistics presided. The principal speakers were Robert G. Martin of the National Industrial Conference Board, Maurice Leven of the Brookings Institution and Hildegarde Kneeland of the National Resources Committee.

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BOOK REVIEWS

RALPH J. WATKINS
Review Editor

The National Capital and Other Statistical Studies, by Sir Josiah Stamp. London: P. S. King & Son, Ltd. 1937. vii, 299 pp. 10*s*. 6*d*.

The eight chapters of this volume are eight addresses and articles dealing with various phases of the question of national wealth and national income, revised and brought down to date by their author, Sir Josiah Stamp. Like Sir Josiah's many earlier publications, these investigations are "purely statistical" in character—concerned primarily with "examining the facts" and presenting the resulting statistical measurements and conclusions in as colorless and dispassionate a way as possible. Thus, for the most part, they leave to others the specific application of the results to current social and economic problems.

In the first chapter, "The National Capital, 1928 and 1935," the author calculates Britain's national wealth in 1935 as 21.5 billion pounds sterling, and in 1928 as roughly 18.2 billions, compared with 14.3 billions in 1914. In commenting on these figures, and on the pitfalls and difficulties encountered in the calculation and interpretation of such estimates, he notes that, despite the apparent increase in wealth, Britain in 1935 had not recovered to the profit-earning, or income-making, level of 1928. There had been merely a change in the description of the country's wealth. Chapter VII, "The Economic Distribution of the National Capital," gives percentage distributions of Britain's national wealth by broad classes in 1892, 1913 or '14, and 1928. Comparisons over a more limited range are also given from the Census of Production for the years 1907, 1920, and 1924.

Chapters II and VIII consider the relationship of profits to prices and to certain other economic series. The importance of profits "in the economic machine" is pointed out as follows:

> If individuals or a group find that they can associate a mass of accumulated capital or savings with a mass of human labour, manual and mental, and produce commodities or services which can be marketed at a figure that allows a margin above the rewards necessary to evoke the supply of the agents they bring together, then they will proceed, and employment results. If they can see no margin, and cannot, in prospect, cover their costs, no employment results. . . . No amount of bureaucratic planning can in the long run overcome the necessity for producing such a surplus for a wide range of products taken together (pages 45–46).

The chapters in question, however, are not concerned directly with a consideration of this thesis. Their purpose is the construction of an index of profits and a statistical analysis measuring the correlation of this index with various British indexes of production, prices, and trade activity, and with an American index of profits—account having been taken of the problem of trend.

Chapter III takes up the problems faced by the income statistician and summarizes the methodology and statistical material utilized in estimating the national income of many countries. Reference is made to the controversial issues involved in differences of definition, to the principal supporters of opposing views, and to the arguments by which the latter defend their respective positions.

In Chapter IV an ingenious technique is utilized for measuring the influence of changing price levels on incomes. Here the conclusion is reached that "the very rich gain relatively in income with a high price level, and lose relatively with a low, their income being highly sensitive to the effects of such changes."

Finally, Chapters V and VI deal with inheritance and the use of alcohol as economic factors influencing the production and distribution of wealth and income.

The book represents a timely addition to the literature of the field and to the author's earlier works—being of particular value in connection with his *Current Problems in Finance and Government*, *Wealth and Taxable Capacity*, and *British Incomes and Property*. Its application to practical problems of the day is assured by its author's intimate understanding of taxation, national debt, and related questions—gained through his long service on British and international boards of inquiry and commissions.

CLEONA LEWIS

Brookings Institution
Washington, D. C.

Wages and Income in the United Kingdom since 1860, by A. L. Bowley. Cambridge: at the University Press. New York: The Macmillan Company. 1937. xix, 151 pp. $2.50.

This book presents a compact summary of Professor Bowley's studies on the subject of wages and their share in the national income in the United Kingdom. Utilizing largely his own writings, which date back to 1895 and cover the period since 1880, revising them at points where such revision can easily be made in the light of recent data, and supplementing them by a few references to other studies, the author discusses briefly money wages, real wages, some aspects of the distribution of earnings, the relation of earnings to needs, the total wage bill, and the share of total wages in the national income. Six appendices present some of the more technical aspects of the measures. An extensive bibliography of the author's writings, supplemented by a brief bibliography of the more important studies by other authors, provides references to the statistical groundwork of the summary estimates discussed in the text.

The estimates refer largely to the period from 1880 to the World War, a few measures are provided for the years back to 1860, and a great deal of

scattered information for the postwar years. The broad features of the long-time changes which these measures reveal are of great interest. Per capita money wages rose from about 59 in 1860 (1914 = 100) to 100 in 1914 and to about 187 in 1930–36. The more significant index of per capita real wages rose from 51 in 1860 to 100 in 1914 and to 129 in 1936. Although the data on the distribution of earnings by size are inconclusive, they tend to suggest for the prewar period a constancy in the relative range as measured by the extreme deciles or the first and third quartiles. The comparison of earnings with needs, based on rather fragmentary data, indicates a significant improvement in the position of wage-earning classes, reflected in a decline in the proportion of families below the poverty line. The total national wage bill showed a greater increase than per capita wages, owing to the increase in the number of wage earners; but this upward trend was damped by increasing unemployment, the index for employment showing a decline from 94.4 for the decade 1880–89 (1914 = 100) to an average of 82.2 for the period 1930–36. In the prewar years, for which comparable data are available, real wages per wage earner rose from 1880 to 1913 as much as did real income per occupied person; but both of these indexes showed a somewhat smaller rise than income per head of population, because of the growing ratio of the occupied population to the total population. Finally, "there was no important change in the proportion of earned to total income between 1880 and 1913 or between 1911, 1913 and 1924 . . . " (p. 97). The suggested stability in the share of wages in the national income appears to hold after 1924 as well.

The above is but a brief summary of the more outstanding conclusions. They are qualified in the discussion and amplified by indication of variations over the different periods in the rate at which the tendencies observed have manifested themselves. The conclusions provide valuable material for anyone interested in the secular movements in wages and the distribution of the national income among functional categories, and suggest a number of significant problems calling for further exploration. Thus, one important conclusion on which Professor Bowley lays stress—the stability of the share of wages in the national income—raises interesting questions as to the mechanism by which such stability was obtained. As the author points out: "It is remarkable that we get very nearly the same percentage, 40 to 43, according to the definition of income, from 1880, or even from 1860, to 1935 . . . " and "this approximate constancy is the more remarkable in view of the fact that the manual-labour class has formed a proportion of the occupied population that has diminished since 1880" (p. xvi). Such stability would not presumably be observed in the share of wages in the income orginating in the various industries in the United Kingdom, and the crude data for the United States suggest that in this country no such stability was observed over similar periods even for the national economy as a whole (the information, however, is available only for the combined share of wages and salaries). The problem of why and how such stability was attained in

the United Kingdom is one that would repay study by statisticians, historians, and economists.

In conclusion one should note the admirable soberness and caution of Professor Bowley's treatment, his awareness of the pitfalls of the data and of the manifold aspects of the questions upon which the data shed light, and the dry humor and pithiness of some of his comments. These characteristics make the reading of this compact volume not only a profitable but also a pleasant task.

SIMON KUZNETS

National Bureau of
Economic Research

Personal Income Taxation, by Henry C. Simons. Chicago: University of Chicago Press. 1938. xi, 238 pp. $2.00.

The author presents an analysis of numerous definitions of income for taxation and advances proposals for reforms in keeping with his definition of income and his theories of taxation. The greatest confusion is found among economists, with but few exceptions, in their definitions of income. Professor Simons declares that income "connotes, broadly, the exercise of control over the use of society's scarce resources." It is "the algebraic sum of (1) the market value of rights exercised in consumption and (2) the change in the value of the store of property rights between the beginning and the end of the fiscal period." He states, again, "the appropriate general conception of income for purposes of personal taxation may be defined as the algebraic sum of the individual's consumption expense and accumulation during the accounting period." He finds his definition of income similar to the definitions of Schanz and Haig. He rejects the well-known concept of Fisher that relates income to consumption but which excludes changes in capital.

The author regards the mitigation of inequality in the distribution of income as an essential purpose of taxation. Toward this end he favors progressive personal income taxation. Taxes on persons should occupy a major position in the tax system, while taxes on things should be of minor importance. Personal income taxation would be substituted for various commodity and payroll taxes. The following proposals would be incorporated in a general tax on personal incomes: (1) Exemptions of receipts by kind would be eliminated, (2) income in kind from the more durable types of consumer capital used by owners would be included in taxable income, (3) gifts, inheritances, and bequests would be counted as part of the recipient's income in the year received, and be subject to a supplementary personal tax in a cumulative form, (4) gains on assets that have appreciated in the owner's possession would be taxed at the time of sale and realized losses would be fully deductible, (5) income taxes would be adjusted for average income over five years, under certain conditions, (6) the tax rates on the lower in-

come brackets would be sharply increased and begin at 20 per cent, and (7) receipts from the normal tax would be shared with the states.

Professor Simons has contributed a logical and thought-provoking essay. As he himself admits, however, his definition of income for personal taxation would involve some complications and require arbitrary decisions in its application. The same criticism, of course, may be directed against any definition of income for taxation. The proper treatment of capital gains and losses, gifts, bequests, and inheritances must remain a matter of opinion for the present at least. Although there is merit in the author's proposal to combine income and death taxes, the proposal raises serious questions that are not easily brushed aside. The author's reform program must be considered not only in the light of his definition of income but also with respect to his plan to lessen inequality by taxation. How far shall we go?

ALFRED G. BUEHLER

University of Pennsylvania

Socialism versus Capitalism, by A. C. Pigou, New York and London: Macmillan & Co, Ltd. 1937. vii, pp. 139 $1.75.

The allocation of productive resources to the various industries; incentives to work, management, and invention; and technical efficiency in relation to profit are old topics in the literature of the economics of socialism. They have seldom been considered, however, by a competent economic theorist from the standpoint of the fundamental ideal of social economy. That ideal is expressed, or reflected, in the theory of general economic equilibrium, in which the productivity of any productive resource is quantitatively the same in all its various applications. Under capitalism, theoretical ideal equilibrium, in which every factor is used where (in the sheer economic sense) it will do the most good, is attainable only under free competition and complete mobility of all factors. Similarly, theoretically perfect economy under socialism could be attained only through perfect, centralized planning. Since, in the complexities of actual life, there can be neither perfect competition nor perfect planning, the relative merits of capitalism and socialism can be judged only pragmatically, on the basis of the ways theoretically open to each form of economy to approximate the economic ideal and the probabilities that these ways will be followed, so far as conflicting interests, limited knowledge, and the extreme complexity of the practical problems involved permit.

This is the theoretical background of Professor Pigou's discussion, although in stating it in such highly generalized terms undue liberty is perhaps taken with Pigou's thought. The background, *in extenso*, is to be found in his *Economics of Welfare*.

Naturally, in so small a book, written for the general reader, the author cannot touch on all of the issues between socialism and capitalism or deal exhaustively with those he does discuss—even though he confines himself to

economic issues and refrains from entering on moral issues, such as freedom versus authority, which now loom larger in the public mind than do strictly economic considerations. Within the limits he sets, Professor Pigou's thought is thoroughly well balanced, eminently fair, and free from the emotional tone and addiction to ideology which impair the value of most of the literature in this field.

Some readers may think that in his desire to simplify and to consider only fundamentals Professor Pigou has in certain places oversimplified, by unduly drastic assumptions, and consequently left the balancing of the relative potentialities of capitalism and socialism too far removed from reality to gain the attention or understanding of the reader not inured to the logical devices of deductive theory. Nevertheless, except perhaps in the chapter on interest rates, he succeeds, as only a master of his subject can, in bringing the essential issues involved in difficult and intricate relations out into high light where even the uninstructed reader should see their significance.

On most counts Professor Pigou finds, on balance, some net advantage of socialism over capitalism, though in some cases it is slight and tentative. Assuming that the state will take over productive resources not by confiscation but by purchase, he concludes that there need be no fear as to the effect, direct or indirect, of socialism on capital formation, and that "the case for socialism as a remedy for inequalities of distribution among persons is much stronger than, at one stage of our discussion, it seemed to be." One chapter deals with the obstacles to "appropriate" or "ideal" distribution of productive resources in our actual capitalism; another with the allocation of such resources through the centralized planning which he assumes in his definition of socialism. He finds valid reason for extending the range of socialization (government ownership and operation) within the general framework of capitalism but cautions that this is not the same as substituting general socialism for the present system. The function of the central planning authority in socialism would be, through a trial-and-error process, to approximate the ideal equilibrium of economic theory, as nearly as complexities and uncertainties permit. He concludes that "the practical task . . . would be one of quite appalling difficulty, and one in which complete success is altogether out of the question," and hence that "except in a world of supermen . . . in any country where socialism as an ideal is being weighed against capitalism as a fact this truth . . . constitutes an argument against change."

On the other hand, in the handling of the unemployment problem socialism, with centralized planning, would have definite advantages over capitalism. In the distribution of consumption goods, presumably on basis of cost, in the allocation of productive factors, and in the provision for investment, it would be necessary for socialism to have an accounting system in monetary terms ("proper" relative prices to be approximated by trial and error or a series of "step by step adjustments"). An accounting rate of interest must be set up—a rate at which the various industries will exactly clear the

market, without shortage or surplus, of that part of money income that is on offer for net investment. "With an accounting rate of interest thus arranged the planning authority can place itself, for this species of allocation, in as good a position as capitalism." There is no reason to suppose that "the free play of self-interest under capitalism tends to bring about every year the optimum amount of capital maintenance and net investment," and "certainly no ground for asserting *a priori* that in this field socialism will produce situations less favorable to general well-being than capitalism would do."

In his final "confession of faith" Professor Pigou says that if he had power to direct his country's destiny he would accept for the time being the general structure of capitalism but would modify it gradually. But, "he would add, in large capitals, a final sentence that gradualness implies action, and is not a polite name for standing still."

On the whole we like this book.

A. B. WOLFE

Ohio State University

Danish Agriculture, Its Economic Development, by Einar Jensen, Principal Agricultural Economist, U. S. Department of Agriculture, Washington, D. C. Copenhagen, Denmark: J. H. Schultz Forlag. 1937. xvi, 417 pp. $3.75.

About the first definite conclusion that Einar Jensen formulated about Americans after he came to this country in 1926 was that somebody needed to write them a book about Denmark that would present his native country to them in terms of fundamental economic, geographic, and historical factors, to take the place of the magic tales he heard everywhere of how folk schools and cooperation had salvaged a desolate people living in a barren land. After hearing Denmark discussed in lectures in economic history at Minnesota and Harvard, he concluded that writing such a book was a needed service to humanity and that he alone could adequately render it, and he was able to convince The Rockefeller Foundation that the task was enough worth doing to justify a grant for it.

That Dr. Jensen has not failed to realize his purpose is evidenced by the following comments made by Secretary M. L. Wilson in a letter to the reviewer: "It is just the kind of book I have wanted for some time. Like many another, I have read a number of popular, more or less emotional and enthusiastic treatises on Denmark; but none of them has analyzed its agriculture in terms of economic concepts and given the answers to my kinds of questions."

The book was mostly written around 1931. It intentionally does not include the developments in public agricultural policy that seem to have come since to Denmark pretty much as to other countries. One finds instead occasional footnotes with a definite suggestion of nostalgia for the old times

in them: "This refers to the pre-depression conditions." "These countries have now been forced into numerous uneconomical restrictive measures," etc. The subtitle of the book is: "A description and economic analysis centering on the free-trade epoch 1850–1930." Successful adjustment of agriculture to world conditions upon an export basis under free trade is a central theme of the study. But this does not mean that Denmark has remained a wholly agricultural country. Manufacturing provides jobs for 28 per cent of the gainfully employed persons as against 33 per cent in agriculture. The parallel figures for the United States are 29 and 21 per cent (1930).[1] Contrary to Friederich List's doctrine, Denmark has made the transition from an "Agrar-Staat" to an "Industrie-Staat" without protection. Dr. Jensen is careful to state, however, that the developments in Denmark can be taken only as "an example of what is possible under certain conditions." He apparently considers these conditions, however, to have been usual in the world in the period 1870–1930.

Another essential theme of the book is that the transition from grain farming to livestock production in Denmark and elsewhere in Europe was not forced by American competition but was well under way before the era of low grain prices. It represented instead a fundamental adjustment of food production and population to each other, which had the effect of replacing food grains by feed grain used as a supplement to forage.

The early chapters present the important background information concerning the natural bases of Danish agriculture, the Danish social background, industrial and commercial policy, and the effects of the inventions and technological developments constituting the "agricultural revolution." One long chapter is devoted to the influence of monetary factors, tariffs, and international trade. Two chapters trace the changes in the agriculture of Denmark decade by decade from 1875 to 1930, first, for the country as a whole in terms of acreage, yield, production of different crops, livestock numbers and production, and imports and exports; and second, in terms of the organization, receipts, expenditures, and net income of a representative farm that made the typical changes through which Danish agriculture passed. Here we see the subsidence of cereal production reflected in a decline of receipts from this source from 1693 kroner in 1871 to 645 in 1901, accompanied by a rise in butter receipts from 299 to 2101 kroner, and hog receipts from 378 to 1199 kroner. Another interesting table compares the probable incomes by decades from 1881 on one of these farms if following the old and the new systems of farm organization. By 1912 the livestock type of organization was yielding a net spendable income of 3548 kroner as compared with 1494 if the farm had adhered to cereal production.

Such an analysis provides an explanation of developments in Danish agriculture that necessarily calls upon cooperative marketing and related

[1] Probably not strictly comparable. See Galbraith, J. K., and Black, J. D., "The Quantitative Position of Marketing in the United States," *Quarterly Journal of Economics*, May, 1935.

formulae for relatively little directly. Dr. Jensen concludes his analysis, however, with a long chapter reviewing carefully both the direct and indirect contributions of cooperative organization and methods, and assigning to these an important role in facilitating the needed changes and augmenting the income from the new agriculture, particularly because of the part they played in improving quality. Danish cooperation is described as "a nonpolitical movement concerned with practical problems," but the cooperatives have contributed in no small way to making "the Danes a more democratic people than any other." An interesting correlative pointed out is that they have shunned government in their cooperative affairs, and they have also shunned the help of the technically trained, especially of business experts, sometimes to their downfall. They have believed that hard common sense would solve almost any problem.

The principal shortcoming of the book is its inadequate treatment of differences in types of farming by regions and in the same region. The reviewer is aware that limitations of space and time are mainly responsible for this; nevertheless the budget analysis of Chapter IX much needs to have been extended to a score or so of other sizes and types of farms found in important numbers in various parts of Denmark. No doubt also a more detailed study of the developments which Dr. Jensen has traced would reveal that he has at times oversimplified—for example, in his treatment of monetary factors and of competition from the New World—and that he has not analyzed as closely as one could desire. But these too may be due entirely to lack of time and space and a desire to write a book that would reach a wider public than professional social scientists.

JOHN D. BLACK

Harvard University

The Federal Reserve Bank of San Francisco, A Study in American Central Banking, by Parker B. Willis. New York: Columbia University Press. 1937. xiii, 277 pp. $3.00.

In spite of the relatively high degree of central control and uniformity of procedure which exists in the Federal Reserve System of today, there is a sufficient number of differences in problems and policies to be found in individual Reserve banks to warrant such special studies as Willis, Clark, and Griswold have recently made of the San Francisco, New York, and Chicago Reserve Banks, respectively.

The Twelfth Federal Reserve District in particular has not only experienced a distinctive economic development, but within its borders branch banking has been developed upon a far more extensive scale than has been the case in any of the other districts. Such familiar problems of central banking, therefore, as member and nonmember relations, credit control, and interdistrict relationships, acquire an added interest when they are presented in connection with the San Francisco Federal Reserve Bank.

The first 79 of the 277 pages which the Willis study contains are devoted to a survey of such background material as the regional type of central banking and its suitability to the relatively remote and financially independent Pacific Coast area, the economic geography of the Twelfth District, and the history of banking in California with some rather sketchy paragraphs covering banking in the other states which form the district.

The author then launches into his subject proper, with discussions covering successively: the establishment of the Bank, its operations, the rôle played by bankers' acceptances and bankers' balances in the district, and the interdistrict and international banking relations of the area. A final chapter of but slightly over four pages in length is devoted to a summary and conclusions.

In this concluding survey, the author expresses his agreement with Lawrence E. Clark in his study of the New York Reserve Bank, that the System's original ideal of a number of practically independent Reserve banks of substantially equal importance and autonomy has not been fulfilled. Instead, there have developed three agencies, viz., the Reserve Board, the New York Reserve Bank, and the group of 11 smaller Reserve banks, with credit policy largely in the hands of the first two agencies. Dr. Willis adds, however, that the other Reserve banks have made important contributions to the growth and improvement of banking in their respective districts. The contents of portfolios have been improved in quality, the use of acceptances has been fostered, and Government examination and supervision placed upon a much higher plane, and the several districts provided with an ample supply of currency.

During the 1920's the San Francisco Reserve Bank was drawn into the controversy over branch banking through the necessity of its approving each application for a branch. The author feels that the Bank should have taken "more positive and prudent action" in the matter.

Although the former hostility to the Bank has given way to a feeling of friendliness on the part of the banks of the district, there is still relatively little use made of its rediscount facilities, especially by the urban banks of the area.

The wholesale absorption of banks in the Twelfth District into branch and chain organizations has lessened the need for the services of the Reserve bank with respect to clearings and collections, as well as credit accommodation, but it still has an important rôle to play in furthering the development of a strong discount and money market on the Pacific Coast and in facilitating the financing of the area's foreign commerce.

Although the regional plan of central banking, in Willis' judgment, has been vindicated, he concludes that "a branch of a large central bank could have performed almost as effectively as the present bank has done."

In the first of the three appendices, the figures from the United States Census of Manufactures are reproduced for the states of the Twelfth Reserve

District covering the decades from 1860–1910. A second appendix is given over to a list of the more important securities on the board of the San Francisco Stock Exchange at the time of the panic of 1907. In the third are reproduced the by-laws of the San Francisco Reserve Bank. No date accompanies them, but a glance at their content soon reveals that they are not up to date. A complete bibliography and carefully prepared index follow.

Dr. Willis has done a careful and painstaking piece of work. He has supplemented all the available published material on this subject with extensive personal interviews with Reserve bank and other banking officials of the district. The real intimate story of the frantic efforts made in the crisis of 1920 and again in 1930–1933 to keep a badly disordered banking system in order would make far more interesting and exciting reading than the present dissertation, but it will not be expedient to produce such a work until the present generation of bankers has gone. Unfortunately, by that time, most of those who know the real story will have gone with them, but if the credit and correspondence files are preserved, they should contain some valuable lessons on banking as it should not be done.

GEORGE W. DOWRIE

Stanford University

The Dollar, A Study of the "New" National and International Monetary System, by John Donaldson. New York: Oxford University Press. 1937. xix, 271 pp. $3.75.

In every respect but name, this is an elementary textbook on money—and a poor one. It begins by discussing "monetary terms," then devotes Part One to the internal and Part Two to the international aspects of recent dollar policies. Historical introductions to individual chapters (on a bare undergraduate level) maintain the textbook character, as does the insertion of "theoretical" chapters. The division of the subject into external and internal policies is a clumsy approach which compels repetition and breaks up the logical course of analysis.

Some sixty pages are devoted to monetary theory; the author's presentation is even less sophisticated than one would expect from an elementary textbook. The reviewer is somewhat embarrassed to find the proper words with which to describe an "economist" who writes as follows:

> Thought about money might be classified into: (1) Pure theories undertaking to *explain the value of money*. (2) Pure theories undertaking to explain its *purchasing power*. (3) Ideas about different *monetary standards*. . . . (4) Ideas, or rules evolved, concerning the *operation* of a monetary system. . . . (5) Ideas as to what are the proper or desirable ends of monetary policy. . . (p. 59, author's italics).

This is typical of the embryonic state of theoretical thought in which Professor Donaldson finds himself. As another example, he distinguishes (pp. 56–57) between "quantity theories" and "marginalist theories and the various forms of 'income theories' " without realizing their fundamentally common ground. The theoretical discussions which the volume offers do not amount to more than a superficial enumeration and quasi-classification of a few undigested books, nor have they anything to do with the analysis of dollar policies which fills the major part of the book. This appraisal of American monetary policies between 1933 and 1936 is announced in the Preface as the essential purpose of the author's endeavors.

As to the way in which this promise is fulfilled, *difficile est satiram non scribere*. In the first place, no analysis of the American banking structure is offered; the reader would be scarcely aware, for example, of the fact that the ratio between loans and investments in bank portfolios has been almost reversed, and nothing is said about the monetary implications of such a development. Secondly, the whole set of new policies, such as the regulation of security issues, margin requirements, eligibility of bonds for bank portfolios, etc., of which the old-time monetary textbook did not even dream, are also conspicuous through their virtual absence in this book. Thirdly, the author practically ignores the existence of a problem involved in the huge gold reserve of this country, or at any rate fails to attack it, as he also fails to visualize the artificial character of the prevailing interest rate structure and the problems which are thereby created. In short, none of the essential issues of monetary policy are discussed. What is offered is a lengthy reproduction of monetary laws, supplemented by a substantial quantity of statistics dealing with prices, production, foreign trade, national income, gold and capital movements, and what not. The net result of lengthy discussion, much of which has little relevance to monetary problems, is such a quotation from a League of Nations' report as "new credit creation by Government policy has in many cases failed to restore the velocity of circulation" (p. 114). Very true, indeed, but one would like to ask what happened in the other than "many cases," and why and how did this or that happen. These are futile questions, so far as the present book is concerned.

Limitation of space forbids the enumeration of factual errors or the lack of conclusions—a curious distinction of the book under review. What, for instance, is its position with regard to the gold standard and managed currency? It *seems* to be for some form of paper money, because (p. 139) neoclassical theories "must discard" the theory of automatic gold flow, and because "paper currency . . . can scarcely be conceived of without some type of control." But, "on the other hand," he hastens to add (pp. 139–40) with a disarming naïvete, the dollar "still has a nominal gold content and the Treasury has a gold-price policy." Theoretical analysis and factual description are rarely to be found in such hopeless mix-up. "The final problem," so it continues on page 143, "for the currency management lies in its lack of a rigidly fixed criterion. . . . " Do we turn against monetary management?

"But the great merit is in the flexibility of adjustment." Are we for it? "On the other hand, once a reasonable adjustment is obtained, there is no reason why very great further changes need be made in the exchange rate for a considerable period . . . , " which means, if it means anything, that the professor is against the gold standard, but for rather stable exchanges "for a considerable period" which is approximately the gold standard. But, "on the other hand," I would not dare to be sure of the implications of such diplomatic language suitable (perhaps) for international conferences of an official type, where nobody is supposed to offend anybody else's feelings and everybody is permitted to indulge in inconclusive reasonings which one cannot read without impatiently waiting for someone to bring some order into an intellectual chaos.

MELCHIOR PALYI

University of Chicago

The Reorganization of the American Railroad System, 1893–1900, by E. G. Campbell. New York: Columbia University Press. 1938. Studies in History, Economics and Public Law, Edited by the Faculty of Political Science of Columbia University, Number 434. 366 pp. $4.50.

In view of the widespread distress among the railroads, one tends to search the story of past railroad reorganizations for light on the present problem. Dr. Campbell's instructive account of railroad reorganizations in the 1890's is not directly pointed for the current plight, but his emphasis on the growth of distress, the development of systems, and the focalization of financial control seems nevertheless to make the study timely.

A number of great railroad collapses are associated with the panic of 1893, but the clues to those disasters are shown by Dr. Campbell to lie, not so much in the immediate impact of that panic, but in the earlier superb build-up for trouble. Both straightforward heroic pioneering and the normal modicum of shadowy maneuvering were there in abundance. Construction that ran far ahead of population would have brought enough financial grief, even if promoters had been altogether honest, merely deluded by overconfidence, merely now and then mistaken. The strains developed by overexpansion could hardly have been wholly relaxed, even if considerations of traffic economy alone had dictated the form and the extent of integration into systems. All the more certain was a day of reckoning in view of the great extent to which the essential job of transportation was overshadowed by the exhilarating pursuit of gullible domestic and foreign investors. And, in view of the great extent to which the leaders of transportation had used their main job as window dressing for financial play, one can hardly visualize the parade of failures marching elsewhere than to the halls of big finance.

Much of the system building preceding the crashes of 1893 reflected far-

seeing attempts to gain diversification and resultant stability through territorial spread. All such spread, however, was subject to the inclusion of moves aimed at limitation of competition, if not at development of regional monopoly.

In the process of reorganization, the prunings, annexations, and consolidations seem generally to have been shaped toward attaining a measure of monopoly sufficient to support rates adequate for designed financial structures. And, with so great a part of the reorganization problem falling to Morgan and his allies, it is not surprising that systems often were worked out to attain harmonious exclusiveness of territorial rights.

It must be observed, however, that, although the stronger among the financially minded did what they could to preserve rate structures against too much competition, they also cut fixed charges wherever it seemed necessary. It may be noted also that, since regulatory agencies were too weak to share the control and competing forms of transportation were fringe phenomena, the solutions in that period of reorganization must be accredited to fairly free giants of railroad finance. Co-ordination, consolidation, and reduction of fixed charges were in the formulae of practical men.

Scenes change. In view of the motor vehicle, a resurgent maritime policy. changed labor conditions, rather stringent financial regulations, and the insistent coloring of the rail regulation with the concept of co-ordinated transportation, the devices of the 1890's may not be the devices for today. On the other hand, the idea of the changing scene may have been overworked. At any rate, this reviewer is grateful to Dr. Campbell for his instructive record of those reorganizations and their background.

J. P. WATSON

University of Pittsburgh

International Trade, by Hugh B. Killough. New York and London: McGraw-Hill Book Company, Inc. 1938. xiv, 622 pp. $4.00.

In this well-organized and carefully documented work on international trade there is a wealth of information. The descriptive side of many problems is carefully examined. As a textbook it should be useful especially in courses in foreign trade.

For review purposes the book may be divided into four general sections. After a brief introductory treatment of the conditions and characteristics of trade across national boundaries, there are almost a hundred pages of historical background material. In this historical section both the theory and the practice of international trade are traced from ancient civilizations through medieval localism and English mercantilism up to the specialization and world-wide trade of the twentieth century. Special attention is given here to the writings of Smith, Say, Ricardo, Mill, Hamilton, and List.

The second section is devoted to the industrial foundations of twentieth century commerce. From the point of view of those interested in obtaining

factual information concerning the distribution throughout the world of population, food resources, power resources, foreign investments, and basic raw materials this is undoubtedly the most valuable portion of the book. The statistics cover not only quantity and value of goods entering international trade but also present tabular and charted information regarding total production and prices.

The third section contains some modern theoretical analysis under the heading of "Twentieth Century Practices and Principles." Even here there is considerable stress on the factual side of the problems, especially in the examination of the international balances of payments and the interaction of foreign exchange rates. In the treatment of comparative advantage and the gains from trade the analysis is quite similar to the marginal cost technique used by Haberler. There is almost no attention given to the theoretical problems arising from cyclical changes, credit shifts, or shifts and changes in supply and demand curves for particular commodities. For the author to expand on these features of international finance and trade theory, however, would necessitate restriction of statistical analysis or would result in an unwieldy text.

In the final section of the book, which describes recent commercial policies and tendencies, the author maintains his world-wide outlook and examines the pertinent policy features of Great Britain, France, Germany, Italy, Japan, Russia, as well as the United States. Particular attention is given to the advantages and disadvantages of tariffs in relation to the United States. It is rather unusual in these times of intense international rivalries and growth of economic programs of self-sufficiency that the author concludes with the following optimistic note, "The United States is moving in the direction of more participation in world economy, not less." Although this observation may be based on wishful thinking, rather than clear-cut economic trends, it gives evidence of the significance which the author attaches to international trade relations.

Even though the book is intended and best suited for the use of undergraduate students in foreign trade courses which are designed to give carefully integrated information concerning international trade and trade policies throughout the industrialized part of the world, it may have some considerable value to the more advanced student because of its exhaustive bibliography. This latter feature is classified in regard to both subject matter and form.

Since most of the book is institutional and descriptive, one might reasonably expect more attention to be given to the reciprocal trade agreements program of the United States and also to the character and effects of so-called administrative protective measures, i.e., customs formalities, veterinary and sanitary regulations, etc. Yet, one risks understatement when he concludes that Mr. Killough has here produced a useful textbook characterized both by a fine sense of perspective and considerable evidence of careful research.

EDWARD C. WELSH

Ohio State University

Population Pressure and Economic Life in Japan, by Ryoichi Ishii. Chicago: University of Chicago Press. 1937. xix, pp. 259. $3.00.

Dr. Ishii has provided for all students of population trends and of Japan's social and economic conflicts an indispensable study. Beginning with a resume of population trends before the Restoration of 1868 the author traces the population growth since that time, analyzing it from a regional and occupational point of view, followed by a demographic analysis. Succeeding chapters discuss the rural economic situation as affecting population trends, the problems of food supply and colonization and immigration and industrialization as remedies for overpopulation. The last chapter discusses birth control and the distributive system. The peculiar value of the work to Westerners without a reading knowledge of Japanese is its primary dependence upon Japanese source materials. Some 115 statistical tables are provided, which are sufficient to enable the critical reader to follow and appraise the value of his interpretations and conclusions.

Two important lacunae among the few sources in Western languages cited by the author have already been noted by Professor Corrado Gini of the University of Rome in his review of the book in *Pacific Affairs* (December, 1937, pp. 480–83). These are the set of demographic, economic, and social studies presented by Japanese statisticians to the 19th Session of the International Institute of Statistics at Tokyo in 1930 and the lectures of S. Nasu and some Western scholars published under the title *Population*. Use of these materials would have strengthened his work at several points. Likewise his treatment fails to make use of Yanagisawa's "Histoire critique des travaux statistique au Japon depuis l'antiquité jusqu'à la restauration imperiale," *Bulletin de L'Institut Internationale de Statistique, 1911*. His material on pre-Restoration population trends fails to contribute anything new. His assertion that the stationary population of the Tokugawa Era is primarily due to the practices of abortion and infanticide is an oversimplification, as Professor Gini had previously disclosed in a review of the Tokyo session of the International Institute of Statistics above mentioned (see *Metron*, Vol. IX, No. 1, Feb. 1, 1931).

Throughout his study the author has made an effort to bring out the close relationship between the population trend and the economic situation. In so doing he minimizes the role which human agencies operating particularly through the state do or might play in determining that situation. Thus in the interests of national defense the state would not consider that overpopulation exists in rural Japan—the reservoir of their military strength. Measures designed to improve rural conditions through an increase of production which would lead to a reduction of the rural population by half would meet with the strenuous opposition of the militarists. They prefer as at present to subsidize the surplus population on the land through relief measures and rice control laws. Likewise measures such as birth control and even efforts at more equitable distribution of income which would result in increased standards of living and lowered birth rate meet with the opposition of vested governmental and economic interests. Although it is true in large degree

in an immediate sense that "population trend is influenced chiefly by conditions and desires of individual families and only very slightly by public dictation" (p. 254), the policies of increasingly more powerful states do create and determine those economic and social conditions which markedly and indirectly over a period of time restrict the range of individual action and choice even in this most intimate field of human relations. Growing awareness of this fact should lead to an accompanying sense of responsibility for social and individual welfare on the part of the still largely irresponsible state. Japan stands in the front rank of those nations that fail most glaringly in this respect and consequently has an acute population problem on its hands.

Japan's problem takes the more concrete form of providing work for some 400,000 more workers each year (E. F. Penrose estimates 200,000) for some years to come, while an eventual solution awaits the year 1960 when Dr. Ishii estimates a maximum population of between 80 and 90 million for Japan Proper will be reached. Dr. Ishii believes, as do most observers, that in further industrialization lies the hope of finding work and means of subsistence for the millions yet to come. Other observations and conclusions reached by Dr. Ishii all merit comment if space permitted. He has written a highly meritorious work which goes far to explain contemporary Japan—its problems and its policies.

CYRUS H. PEAKE

Columbia University

International Raw Commodity Price Control, by Robert F. Martin. New York: National Industrial Conference Board, Inc. N.I.C.B. Studies Number 238. October, 1937. xvi, 166 pp. $3.50.

The bitter conflict between man and his environment has been shifting its emphasis in recent decades from the struggle to produce to efforts toward control of what is produced. No better evidence of this struggle is needed than that contained in Dr. Martin's contribution to the literature of price controls. Competitive markets for such foodstuffs as coffee, tea, sugar, and wheat, and for the essential raw materials, cotton, silk, rubber, copper, and tin have been too competitive to satisfy producers. Failing to control either prices or production, they have watched prices drop to levels which were unprofitable to many of them or at least not profitable enough to satisfy them. The consequence has been a turning to government or the exercise of various monopolistic types of control, first of prices and later of supplies and production. The history of these various price controls as revealed by statistics of prices and stocks, between the years 1920 and 1936 for the most part, of the nine commodities mentioned is told by Dr. Martin in this compact volume, which he prepared originally as his doctoral thesis.

Dr. Martin is well qualified by long experience in the Department of Commerce and in the National Industrial Conference Board to handle a statistical study of this sort. He has confined himself quite rigidly, too much so in

the opinion of this reviewer, to a purely descriptive and statistical approach. A general chapter on price controls is followed by nine chapters, each of which describes a particular commodity. The book lacks both index and bibliography but contains a useful statistical appendix which includes monthly price quotations and indexes of each of the nine commodities from January, 1920, through December, 1936, as well as similar data on visible world supply for coffee, cotton, tea, tin, and wheat for the same years. Copper, rubber, silk, and sugar supply figures are not available for all of the earlier years. Sources of these data and methods of compiling indexes are also explained in the appendix.

Apart from the tabulations in the appendix only one statistical table is used in the text, and this unfortunately omits references to the source of the data. Charts and graphs are used liberally and effectively throughout the study in presenting the statistical material

Paralleling the neglect to include a bibliography is the general paucity of references throughout the text to source material and to earlier studies. To illustrate, this reviewer could find no reference in the chapters on coffee and rubber to other contributions on this subject. Such a book as the Brookings' study, *International Control of Raw Materials*, by Wallace and Edminster, for example, is not cited.

Dr. Martin's study is a concise statistical handbook which should provide a useful reference work to students of price control as well as to business men and students interested in foreign commerce.

N. H. ENGLE

Washington, D. C.
April 6, 1938

World Prices and the Building Industry, Index Numbers of Prices of 40 Basic Commodities for 14 Countries in Currency and in Gold and Material on the Building Industry, by George F. Warren and Frank A. Pearson. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. 1937. v, 240 pp. $3.50.

The general monetary thesis of this book, which is the fourth in "The Price Series"[1] written by Professors Warren and Pearson of Cornell University, differs little if any from those of its predecessors. Because, in the words of the authors, "the most significant business factor to consider since 1914 has been the changing price level, that is, changes in the value of money" and "the next most important business factor is the building cycle" (p. iii), the first part of the book attempts a comparison of the prices (in both gold and currency) of basic commodities in various countries, and the second part is devoted to the building industry. A total of 190 graphs is offered in substantiation of the validity of the general argument and of the belief that "changes in the value of money" merely mean changes in the quantity of gold and/or variations in the demand for this metal.

[1] *The Agricultural Situation* (1924), *Prices* (1932), and *Gold and Prices* (1935).

Although the monetary theories of Professors Warren and Pearson have already evoked considerable comment from capable scholars of monetary matters, it might be apropos to suggest anew a few relevant points in criticism of their theories. The quantity theory of money (which, at best, should be considered applicable only in the long run) is modified by the authors as being $G = PT$, where G is the quantity of gold; P, the price level of basic commodities; and T, the volume of trade. The authors are really commodity theorists. Bank and private credit, its velocity of circulation, and even the velocity of circulation of gold are considered of such minor importance in determining the price level that they are virtually ignored (see, especially, p. 76). It is stated (p. 64) that "if a country raises the price of gold at a time when the world value of commodities is stable, internal prices will rise *in proportion to the advance in the price of gold*" (italics of the reviewer). That a country may "sterilize" a part of its gold stock for either a long or a short period of time is not recognized as even a theoretical possibility. Changes in the world's "economy" of gold such as the increasing use of deposit banking with lowered fractional reserves and the adoption of the gold exchange standard, it would seem, are thought to have had no substantial effect on world prices.

Professors Warren and Pearson fail to appreciate adequately the fact that the present-day monetary system gives rise to problems different from those facing countries in which gold coins or certificates constitute the only circulating medium. They admit, however, that the policies of central banks may affect the world value of gold but only in the short run (p. 94). Although one may claim, of course, that over several centuries these short-run changes in banking policy may cancel and leave the trend of prices in harmony with the trend of gold production, there is no historical justification for assuming that such will be the case. Is it reasonable to assume that the world will readopt its 17th- or 19th-century monetary and banking policies in the next hundred years? The authors fail to recognize that, if all central banks and banking systems in the leading countries of the world pursue the same monetary policies, the value of gold may be permanently changed. For any realistic study of business activity, furthermore, it is the short-run changes in monetary policy which are important.

This narrow interpretation of the quantity theory naturally leads to the view that the only way to raise the price level, if the gold standard is to be maintained, is to increase the currency price of gold via revaluation. In support of this thesis Professors Warren and Pearson show that the price level of 40 basic commodities rises as the gold value of a nation's currency is decreased through devaluation. It is important to note that the majority of these basic commodities have international markets and prices. Few 19th- and 20th-century economists have denied that devaluation results immediately in increased prices of imported commodities and somewhat later in rising prices of exported commodities. One is puzzled, therefore, at the authors' surprise over their "discovery" that the price indices of their 40 basic commodities vary inversely with revaluation.

When the reviewer first received his copy of *World Prices and the Building Industry*, he expected to find an analysis of the building cycle in terms of Mr. Keynes' profit inflation and deflation. Many theorists and economic historians agree that selling prices in general rise much faster than cost of production (and other "sticky" prices) when the quantity of circulating medium is rather suddenly increased, thereby causing business booms. The 16th- and early 17th-century "price revolution" occasioned by the discovery of America and the theft of its vast treasure hoards is thought by Mr. Keynes[1] and Professor Earl J. Hamilton[2] to have played a considerable rôle in the rise of capitalism in Western European countries, but adequate price data which would permit a careful analysis of the cost-price situation for these earlier centuries are still wanting. Professors Warren and Pearson, on the other hand, are embarrassed by the abundance of statistics for the 19th and 20th centuries. It was thought, therefore, that their two problems —the changing price level and the building cycle—would be dovetailed and the profit-inflation theory of business prosperity either substantiated or qualified. Such is not the case. The first chapter of their book, however, treats the relationship of prices of basic commodities to other prices, namely, agricultural and industrial wages, the cost of living, prices of manufactured and processed goods, administratively set prices, interest rates, and taxes; but the full significance to business cycles of the relative "stickiness" of some prices which is revealed is completely ignored. The changing disparities between building costs and rental or sales values are assigned no rôle in their analysis of the building cycles, which are said to have averaged 18 years in length in this country from 1830 to 1936 and slightly longer in Europe.

The authors believe that "there is no such thing as a definite business cycle . . . " (p. 154) but that what is generally meant by the term is merely a composite of the production cycles of all goods. "Business," it is stated, "is the algebraic sum of many forces" (*loc. cit.*). The significance of such a statement escapes the reviewer. "Much greater progress in studying business cycles will be attained when, in addition to changes in prices, studies are made of each individual industry, and these forecasts combined rather than attempts made to learn from the scrambled effects" (p. 157). In Chapters VIII and IX the production cycles of food, textiles, automobiles, buildings, horses, cattle, sheep, hogs, and eggs are compared with general production cycles, and the trends are found to be *only broadly* similar. Few economists would question the relevancy of production cycles in the steel industry, for example, to swings in general business activity; however, the analysis of business cycles suggested by Professors Warren and Pearson would require a careful study of the swings in the production of all commodities—or, at least, of all basic commodities. The great danger, of course, from such analysis is that one would most likely be unable to see the forest (i.e., to understand general cyclical movements of the past and to forecast business changes) because of the large number of individual trees.

[1] *A Treatise on Money* (New York, 1930), II. 152 ff.

[2] "American Treasure and the Rise of Capitalism," *Economica*, November, 1929.

Who has denied that the building industry *affects* other phases of our economy? The authors' attempt to demonstrate that the state of this industry *causes* prosperity in transportation, banking, and manufacture generally (Chapter VII) is, however, unconvincing. Were one to compare the automobile production cycles with those of other industries, one would certainly see similarities in their trends, perhaps much greater than those indicated in Figures 1, 8, 9, and 14 of the same chapter.

Those students who have desired at one time or another price data compiled on a comparable basis for the United States, Canada, England, the Netherlands, France, Belgium, Italy, Spain, Bulgaria, Australia, Germany, New Zealand, Sweden, and Finland since 1910–13 will appreciate Professors Warren and Pearson's contribution in this regard. It is regrettable that the composite index of the world price level is composed only of those indices for the United States, England, France, Spain, Canada, the Netherlands, and Belgium (p. 18, n. 1)—all of which countries are either North American or Western European; China, India, Japan, Russia, and South America certainly play more important rôles in international economics than Spain, Belgium, and the Netherlands. The authors apologize for not having included in the world composite index their price indices for Australia, New Zealand, Finland, Sweden, and Germany (*loc. cit.*); but the fact that the charts were already drawn before these data were available is not, in the opinion of the reviewer, sufficient justification.

WARREN C. SCOVILLE

The University of Texas

Analyses of Business Cycles, by Arthur B. Adams. New York: McGraw-Hill Book Company, Inc. 1936. xi, 292 pp. $3.00.

Events of far-reaching importance to business cycle analysis have occurred since *Economics of Business Cycles* was published by Dean Adams 13 years ago. The new book, partially a revision of the older one, indicates an attempt on the part of the author to take into consideration in his theoretical analysis new conditions affecting business cycles.

The principal distinguishing feature of Adams' earlier business-cycle theory was the contention that each business cycle has a definite end which comes when there has occurred a moderate recovery from depression. The cumulative expansion of business during a period of prosperity does not grow out of conditions previously existing. On the contrary, it is brought about principally by an increase in the production of gold, a favorable balance of trade, wars, or a rapid expansion of capital equipment.

In *Analyses of Business Cycles* much less stress is placed on this part of the theory, although the idea of a definite ending is retained. Emphasis is shifted to a large extent to an analysis that hinges on a distinction between two types of cycles: the inflation-deflation cycle and the overinvestment-underconsumption cycle. The chief feature of the inflation-deflation cycle is an inflational rise of the price level on the upswing of business and of a defla-

tional fall on the downswing. The expansion phase of the overinvestment-underconsumption cycle is typified by an increase of the capacity of production greatly in excess of the ability of consumers to purchase the goods produced. Whereas Dean Adams formerly treated price rises and business expansion as twin processes, in his revised theory be dissociates the two when he discusses the overinvestment-underconsumption cycle. He even asserts (p. 200) that the price level has little or nothing to do with such cycles. Moreover, the requirements of stability as set forth assign secondary significance to the price level. For stability "it is necessary to maintain a proper balance between net production, national money income, the flow of finished goods, and the expenditure and investment of the income" (p. 25). A balance would tend to be maintained were it not for booms initiated by the "creation and use of a great deal of new purchasing power through the expansion either of bank credit or of government credit" (p. 101).

Although the earlier book, *Economics of Business Cycles*, constituted an important advance toward a general economic treatment of business cycles, and although the present book is an improvement, one has a feeling that there remain some conspicuous deficiencies. *Analyses of Business Cycles* is more largely an analysis of Dean Adams' concept of the problem of business cycles than of quantitative information concerning such cycles. In fact statistical analysis has not been used effectively as an aid in the solution of the problem. A "composite index of business activity" is presented, but it lacks precision because of the inclusion of unrelated series such as those for industrial production, bank loans, and commodity prices without reckoning of the specific service that those series perform in the index.

There are numerous points on which one may disagree with Dean Adams. The chief weakness of the book is that controversial points are usually unsupported with tangible evidence. To choose one illustration: business cycles are assumed in the book to arise largely from growing maldistribution of wealth. On the other hand, some business analysts believe to have satisfactorily shown that there is no more maldistribution now than there was some decades ago. To these analysts Dean Adams offers no reply, nor does he point out the extent to which business cycles and maldistribution may have had a parallel development.

Owing to unanswered questions of this nature and in general to the subjective character of the argument, a wide difference in reaction toward the book is to be expected. Nevertheless, Dean Adams has ably presented his point of view on the theoretical aspects of business cycles.

WILBERT G. FRITZ

University of Pittsburgh

Sales Analysis from the Management Standpoint, by Donald R. G. Cowan. Chicago: University of Chicago Press. January, 1938. xi, 210 pp. $2.50.

In this book, which is a revision and expansion of a series of articles previously published in the *Journal of Business* of the University of Chicago,

Mr. Cowan has turned in the sort of intelligently planned, conscientiously executed, and carefully checked piece of work which those interested in marketing research have learned to expect from him.

The volume is just what the title says it is. First, it is an analysis, mainly statistical, accomplished chiefly by the use of correlation, of the sales records of various firms and of market information which is available from various public sources. Second, it is a discussion of the uses which the marketing manager may make of such analyses and their results in enhancing the profitableness of the sales operations of his firm.

Mr. Cowan first considers the setting of quotas. He discusses the various methods and devices which have been employed in the work of analyzing the sales potentialities of various geographical areas for specific products. In so doing, he rather completely demolishes the theory that the general index of purchasing power is useful for this purpose. He makes out a very good case for the proposition that the factors indicative of sales possibilities are usually specific for each product or related group of products—sometimes even for each geographical area in which a product is sold.

The author next discusses the various means of measuring the fruitfulness of the several types of sales effort. This involves a description of the statistical devices by the use of which it is possible to discover the influence of the different types of salesmanship, advertising media and appeals, and sales promotional efforts upon the volume disposed of. This discussion leads logically into a consideration of the methods of allocating various types and differing quantities of sales effort to geographical areas, types of customers and products. The means of analyzing the costs of selling and distribution and allocating them to the various elements of the marketing process are described. Mr. Cowan does not go extensively into the accounting technique involved in this work but contents himself with presenting the uses which may be made of such cost data after they are derived.

A final section of the book is devoted to a discussion of the application of these methods of analysis and the results of their use to the problems of managing the selling and distributing activities of the business. Of course, this subject is touched upon constantly throughout the volume. In this section, the author emphasizes the manager's task of coordinating the diverse influences which are brought to bear upon each marketing unit and of harnessing the menacing forces of competition and the erratic and unpredictable pressures generated by shifts in consumer demand to the task of producing profits for the firm whose destinies he guides.

The statistical treatment employed by Mr. Cowan follows the conditions established for reliable correlation results. The reduction of sales and other similar series to a per capita basis and the use of logarithms to give a more nearly normal distribution of each variable represent refinements of statistical procedure which might well be emulated. Although most of the methodology has been quite advisedly omitted, sufficient explanation of the statistical steps has been included in the footnotes to indicate that Mr. Cowan has delicately handled his statistical instruments.

To teachers and others who are seeking examples of the application of statistical methods, the book offers most interesting material. If the interpretation placed upon some of the results, as, for example, the designation of the relative influence upon sales of each of the various independent factors, seems to be somewhat dogmatic, the careful reader will observe that Mr. Cowan is quite familiar with the limiting conditions but has deliberately chosen to subordinate them. His has been the difficult task of applying very technical quantitative methods to a problem in the qualitative aspects of which a very considerable audience is interested. By steering a happy middle course, he has succeeded in demonstrating how fruitful the statistical approach to the problem may be without alienating the interest of those who have little heart for some of the more technical and slippery concepts which multiple correlation involves.

Mr. Cowan is the first to admit the obvious weakness of his volume—"its fragmentary nature." It resembles a mosaic, each piece of which is shaped and placed with infinite care and precision but which is marred by numerous vacant spaces in unexpected and illogical spots, so that, although its pattern is clear and unmistakable, it is obviously an incomplete and piecemeal job. This weakness is inevitable, since the volume is based largely upon the experience and observations acquired by a practitioner of sales analysis during the course of his work in a single industry and because of the further fact that the author has been so busy adding new provinces to the realm of marketing research that he has perhaps lacked the time to work out a complete synthesis of all its parts. In spite of this defect the book is an excellent one which both the students and practitioners of marketing research will find it profitable to study with meticulous care and to keep constantly at hand for reference and suggestion in their own work. The material which it presents constitutes a significant addition to the knowledge and technique available for use in the field.

R. S. ALEXANDER
R. PARKER EASTWOOD

Columbia University

Lectures and Conferences on Mathematical Statistics, delivered by J. Neyman at the Graduate School of the United States Department of Agriculture in April, 1937. Revised and supplemented by the author with the editorial assistance of W. Edwards Deming. Washington, D. C.: Graduate School of the U. S. Department of Agriculture. 1938. 160 pp. $1.25. Great Britain: Department of Statistics, University College, London W.C. 1. (Foreign postage extra.)

The subject matter for the three lectures consists of a discussion of modern concepts in probability theory and their application to the problem of testing statistical hypotheses. The point of view taken is that of Kolmogoroff, Fréchet, and other continental probabilitists and is a postulational approach which reduces the problem to a treatment of a class of functions known as

completely additive set functions. In this theory, "events" are idealized as *sets* which in turn are represented by sets of points in a space of one or more dimensions (depending on the number of variables characterizing the "event"). The idea of frequency of an event is abstracted by associating a non-negative number (called probability) with the set corresponding to the event. Associated with manipulations and calculations about events and relative frequencies of events (such as determining the number of "cases" having either property A or property B, or both properties A and B) are operations on suitably restricted point sets (Borel sets) and their corresponding non-negative numbers. Adjoining the assumption that the non-negative number associated with the sum of an infinite sequence of nonoverlapping sets is equal to the sum of the non-negative numbers associated with the individual sets, the theory is thus reduced to a consideration of completely additive set functions and the theory of measure.

From a mathematical standpoint this is perhaps the most elegant and logically self-consistent theory of probability which has yet been devised, but, in spite of the fact that notions and suggestions are borrowed from the empirical field and are abstracted, the theory is not a frequency theory of probability. The statistician who thinks of his data in terms of frequencies and is interested in using probability theory in the interpretation of his data will find that the gap which must be bridged by intuition, between this theory and its application to actual observations, is no smaller than that between any other theory of probability and its application.

The discussion on probability theory is admirably carried on with a minimum of technical detail and is greatly clarified by an assortment of numerical examples. Throughout the three lectures the author repeatedly calls attention in one way or another to the danger of confusing the mathematical theory with actual empirical occurrences. In fact, the main theme of the lectures seems to be that the mathematical theory of probability should be considered as a model to assist in making successful predictions about phenomena in which there is an element of "randomness" present, and, in order to use it properly in any given situation, the appropriate model and its limitations should be thoroughly understood.

The six conferences are most varied in content. The first one is a discussion of randomized and systematic arrangements (particularly the half drill strip setup) of field experiments which has been a controversial matter between R. A. Fisher and "Student." The critical point is whether or not significance tests can be devised which will be applicable to systematic arrangements. Dr. Neyman discusses "Student's" method and also his own method of "parabolic curves" for handling the case of systematic arrangements. It will perhaps be of interest to some readers to know that this subject is discussed by "Student" himself in a paper written shortly before his death and which has just appeared in *Biometrika*.

The second conference deals with problems of plant breeding with special reference to the problem of breeding new varieties of sugar beets. The author considers only the case of one new variety, using deviations of sugar

content from a standard, and their sampling theory (assuming the true average deviation is not positive) as criteria for selection.

The third conference is largely concerned with the principles of *stratified* sampling in social statistics. The importance of these principles seems to be realized by successful public-opinion and straw-vote experts. Failure to recognize the essentials of the method of stratified sampling is likely to lead to such disastrous results as those of the *Literary Digest* 1936 presidential poll. The use of *purposive selection* as a device for estimating social and economic characteristics of populations is strongly condemned. As a shining example of the treachery of this method for census purposes, the author cites the futile efforts of Gini and Galvani to preserve the essential characteristics of an entire Italian census by keeping the data of 29 of the 214 circondari, the 29 being selected on basis of the means of 12 characters.

The fourth conference is devoted to mildly condemning what is termed "empirical statistical research in economics," although admitting its practical value at present, and praising the "a priori" method. Examples of each type of research are discussed, together with an analogous situation in the history of astronomy in which there was a general shift from an "empirical" to an "a priori" approach at the time of Newton. It is rather evident that the author's primary interest in economic series from a statistical point of view is in the possibility of developing mathematical models from a few "reasonable" hypotheses, which will correspond to economic processes.

In the last two conferences the author discusses on a fairly elementary level some of the fundamental notions of statistical estimation and confidence intervals.

The stress throughout the lectures and conferences has been placed on certain basic concepts in statistical inference. A noteworthy feature of the book is a record of questions from the audience and Dr. Neyman's replies. Theoretical and practical statisticians alike will find the book well worth reading.

S. S. WILKS

Princeton University

An Introduction to the Theory of Statistics, by G. Udny Yule and M. G. Kendall. Philadelphia: J. B. Lippincott Company. London: Charles Griffin & Company, Ltd. 1937. Eleventh Edition, revised and reset. xiii, 570 pp. 55 diagrams and 4 folding plates.

"The *Introduction to the Theory of Statistics* having completed five-and-twenty years of life, it was decided that the time had come when a complete review should be made. . . . In this revision . . . very little of the material appearing in earlier editions has been deleted. . . . The larger changes are almost entirely in the form of additions . . . several new chapters on *Sampling* . . . on the *Moments and Measures of Skewness and Kurtosis*, and on *Simple Curve Fitting by the Method of Least Squares* . . . a new chapter on *Interpolation and Graduation*" (by finite differences). Thus the preface,

without a word about one of the best features of the book, namely, 34 pages of references which are well classified and also *indexed* by author and title and made a part of the general index at the end of the volume. Since the older book is well known, the reviewer will confine himself almost wholly to the parts in this edition which are new. They comprise a very considerable portion of the whole, and so it is rather a pity that it was necessary to leave the remainder of the old book unchanged. The arrangement could have been improved and the general argument simplified had it not been necessary to deal with large chunks of the older work en bloc. Another difficulty hanging over from the tradition of 25 years ago was that it was felt necessary to write the book without using the calculus, except in rare instances. That, in view of the very modern methods which were to be explained, was too much of an order. In general character, the book is not easier reading than the earlier one, and it is safe to say that almost no one is going to study it who has not already attained a fair degree of mathematical maturity, much greater than is involved in the study of a little calculus. Thus, to American students who are accustomed to six weeks or more of baby calculus in their freshman years, this non-calculus requirement is to lay aside an easy and facile tool, and it implies that nothing worse than freshman mathematics is to be encountered, which is not at all the case. Another subject curiously omitted, except for brief references here and there, is the theory of probability. There are touches of it in connection with the theory of the point binomial, but in general even there the emphasis is on the study of the point binomial as a statistical phenomenon rather than on the solution of problems in probability by means of the point binomial. Hence there is only slight reference to the use of the normal curve in finding the sum of a number of consecutive terms of a point binomial, and there is no attempt to secure a better approximation by a skewed curve.

In spite of these omissions, the author has managed to deal with the newer subjects mentioned above with clarity, and in most cases to give enough of the mathematical background to enable the worker to see why various rules are laid down for him. In this respect the book is a distinct improvement over some of the guides for the research worker which give only the rules. Moreover, the authors take pains to discuss rather at length the various limitations and possibilities of their methodology. This is a comfort. One need not read a sentence over six times in order to find out exactly what it does mean and what it does not. There are two or three other sentences that go with it, and they can be read instead. In form and printing the volume is a great improvement over the earlier edition. The binding is poor. There are many good problems with each chapter and a list of answers at the end. There is a sufficiently adequate set of tables. The "summaries" at the end of each chapter are a valuable addition.

Probably most interest in the revision will be in the three new chapters on *Sampling Theory*. In the first of these the authors prove the customary formulas for the standard errors of percentiles, mean, difference of two

means correlated or not, moments, standard deviation (not done rigorously), correlation coefficient, Pearson's β_1 and β_2 correlation ratio, and multiple correlation coefficient. Karl Pearson's development of this theory is followed closely. Some of the demonstrations could have been improved by the use of semi-invariants. In deriving the formula for the correlation between the errors of percentiles (p. 385), use is made of the unproved assumption "that missing observations tend to be spread over the other sections of the curve in proportion to the respective areas and thus tend to produce an error, etc." As has been shown by the reviewer* this assumption can be obviated by a simple use of the multinomial theorem.

The next chapter is devoted entirely to the chi-square distribution, an excellent account in general, so far as was possible with the mathematical limitations imposed at the outset. There is one minor criticism, however. From Weldon's dice data P is found to be about .00072; from the same data the observed mean is found to differ from the theoretical mean by about five times its standard deviation, leading to a probability of about .000003, and so the authors say: "We see that the data are really more divergent from theory than the chi-square test would lead us to suppose." It would seem to be better to say that two different hypotheses are being tested here, and that the first is not so surely to be rejected as is the second.

The third of these chapters deals with Student's distribution, with Fisher's t pertaining to a mean, Fisher's z pertaining to the difference of two means, with the analysis of variance, and some corollaries, and with the distribution of the coefficient of correlation, the parent universe being normal in all cases. Not a very thorough account is attempted for the analysis of variance, "not more than . . . to explain the general principles of the method," and it is not as satisfying as is the discussion of some of the other subjects, but it is readable and helpful.

The final chapter in the book is also new: *On Interpolation and Graduation*, by Mr. Yule. Wisely, we think, considering the limited objective, the author restricts himself to Newton's series and its immediate consequences. His account of inverse interpolation is too short, being limited to finding the inverse solution of the best fitting quadratic parabola. At least he might have stated that, whenever direct interpolation can be done successfully, one can interpolate inversely by first subdividing the intervals by direct interpolation (a process he has explained), and then using linear interpolation to get the inverse solution desired. Indeed, for functions which, in the direct form, are polynomials, this is a surer method than certain of those "more direct methods given in advanced works." There is an illustration given in this chapter which is so striking that it deserves repetition in full.

> Thus, in the Census of England and Wales there are conspicuous peaks at the round-numbered ages 30, 40, 50, etc. (last birthday), and hollows or deficiencies at the ages ending with 1 and, less emphatically, at the ages ending with 7. With returns from less educated populations, the phenomenon may become almost ludicrous, *e.g.* in a certain Indian census sample-count:

* The Multinomial and the Chi Test, *Transactions of the American Mathematical Society*, vol. 31 (1928), p. 135.

Age Last Birthday	Number of Males
29	927
30	12,294
31	652
32	2,058
33	672
34	892
35	7,723
36	1,437
37	870
38	1,362
39	467
40	10,391
41	460

The scope of a book like this may be indicated by listing both the topics it includes and some that it does not include. The following are either omitted or considered only very briefly: likelihood in Fisher's sense, fiducial limits, efficiency of statistical estimates, inverse probability, polynomials of Hermite, Pearson's curves (mentioned very briefly), frequency curve fitting, graduation by means of a normal distribution of a series which is ordered but not measured, correlation in contingency tables between ordered but not measured characters, polychoric r. The last two subjects are covered partly by a remark about tetrachoric r, but this, the authors say, involves some difficult mathematics and "is outside the scope of the book . . . The student should realize that the product-sum correlation and the tetrachoric correlation are . . . two entirely different measures. . . . The one is in no sense an approximation to the other." This statement is very misleading, for if the distribution is exactly normal the two measures are exactly equal and mean the same thing. The mathematics for tetrachoric r is no more difficult than that involved in the chi-square test. In the opinion of the reviewer, it would have been better to have omitted the Yule "coefficient of association Q" (p. 46), which had appeared in the older book, and spent the space on an exposition of tetrachoric r; for the latter has a simple interpretation, and, with the tables now available, its calculation is short and easily explained.

BURTON H. CAMP

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The Methods of Statistics, an Introduction Mainly for Experimentalists, by L. H. C. Tippett. London: Williams and Norgate, Ltd. 1937 (2nd edition). 280 pp. 15*s*.

Tippett's book is so widely and favorably known that the following comments are devoted largely to a recital of some of the important respects whereby the second edition differs from the first. The revision is more than a nominal one as the book has been enlarged by some 57 pages.

The brief introduction has been rewritten. Chapters II and III of the first edition have also been rewritten and enlarged, comprising now three chapters entitled "Frequency Distributions and Constants," "Distributions Derived from Theory of Probability," and "Errors of Random Sampling

and Statistical Inference." A few proofs have been added in the first two of these chapters. New material is most prominent in the third and includes consideration of levels of significance and rejection and acceptance of hypotheses, standard errors of functions of statistical constants, determination of population value from sample (fiducial probability), choice of statistical constants, and method of maximum likelihood. The discussion of fiducial probability would be improved, in the reviewer's opinion, if the illustrative diagram were drawn to scale and perhaps also if it were shown how fiducial limits of p may be ascertained from

$$\chi^2 = \frac{(a - \frac{p}{q}b)^2}{\frac{p}{q}N},$$

thus enabling the limits of p to be computed for any desired N and for various confidence coefficients.

The chapter on Goodness of Fit and Contingency Tables is essentially as before. That dealing with Small Samples includes a new section on the Neyman-Pearson L_1 test for use when there are a number of estimates of variance. This chapter no longer includes the chart of the t distribution for $n = 4$ compared with the normal distribution, a very illuminating graph for the student.

The chapter formerly treating of the sampling distribution of the correlation coefficient has been expanded to include regression constants. The discussion if intra-class correlation and that of correlation of ranks formerly included in the chapter on nonlinear regression are not included in the present volume. Chapter X, "The Further Theory of Errors and Principles of Experimental Arrangement" is greatly enlarged, having new portions concerned with economy in sampling, sampling from a limited field, the use of controls, and multiple factor experiments.

For the intermediate student this is a most valuable volume. Frequently, points which are elusive in Fisher's *Statistical Methods for Research Workers* are cleared up for the reader by Tippett because of more extended discussion, explanation, or illustration. There is, however, no adequate table of areas of the normal curve, no t table, no z (or s_1^2/s_2^2) table, and no table of χ^2. For the actual use of the principles and methods discussed the reader must therefore refer to one or more other publications. Perhaps the author will append these tables in a later printing or edition and increase the usefulness of the book.

FREDERICK E. CROXTON

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The Treatment of Clinical and Laboratory Data, by Donald Mainland. Edinburgh and London: Oliver and Boyd. 1938. xi, 340 pp. 15s. net.

This book has been prepared for the express purpose of aiding the clinician, untrained in statistics, in the evaluation of the significance of clinical and

laboratory observations when presented in small samples. In the main, the subject matter consists of the discussion and application of (a) the concept of chance deviations, (b) the chi-square test, (c) the analysis of variance, and (d) correlation and regression statistics.

The illustrative problems are well chosen and are representative of the majority of statistical questions which arise in medical research. The analytical technique employed is in general appropriate, although the author, perhaps for pedagogic reasons, seems at times to prefer complicated methods to simpler ones equally adequate for the practical purpose to be served. On the other hand, considering the general objective of the book, some parts of the discussion leave something to be desired. Clarity and thoroughness in the exposition of theory appear to decrease as the methods become more complex. Explanations of the ideas underlying certain procedures are often cut short and the reader is referred to other textbooks. As a consequence, only a person already acquainted with the subject can apply some of the procedures described with any degree of assurance as to their significance and limitations. In addition, the critical attitude of the author toward the clinicians who do not use statistical methods seems a bit overstressed in spots. There is a trace of inconsistency when, for example, after properly berating those who substitute "common sense" for statistical analysis, it is considered unnecessary to give any proof of the equation for the standard error of a mean because "the reader will note the *reasonableness* of the formula." [The italics are the reviewer's.]

ANTONIO CIOCCO

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Report of Third Annual Research Conference on Economics and Statistics, June 28 to July 23, 1937. Colorado Springs, Colorado: Cowles Commission for Research in Economics. 108 pp.

The Cowles Commission, founded in 1932 for the purpose of encouraging research in the field of economic science through the application of mathematical and statistical techniques, present in this brief volume of one hundred and eight pages abstracts of conference and public lectures delivered at their annual conference in 1937. Abstracts of some thirty-nine conference lectures, compressed into about one hundred pages, outline the methods employed and indicate the principal findings reached, without any attempt at detailed presentation of all the analytical steps involved. This method of presentation does not make the perusal of the report easy for any but the expert reader, but for the most part the complexity of the subjects treated and the techniques applied are such as to limit its usefulness to the mathematically and statistically trained students of the social sciences.

It would be presumptuous on the part of this reviewer to attempt a de-

tailed evaluation of the findings presented in this report. Contributions to the theory of index number construction and probability are made in eleven of the abstracts. Questions arising out of the statistics of commodity and security price theory were treated by twelve speakers, with the mathematical aspects of utility analysis occupying the attention of most of the remainder. The conference abstracts conclude with a group of significant suggestions by Professor Schumpeter on the quantitative study of the trade cycle. Abstracts of three popular lectures by Professor James Harvey Rogers on "Some Lessons of Recent Money Policy in the United States," Dr. Thornton C. Fry on "Probability and the Telephone Plant," and Mr. Carl Snyder on "The Relation of High Profits to High Wages," are presented in the concluding half-dozen pages.

In his opening conference paper on "The Econometric Problem," Professor Harold T. Davis draws attention to the importance of comparing the periodogram of the log correlation function of an economic series with the periodogram of the function itself. An attempt to explore the random element in the movement of economic time series was made, and it was found that variations from the linear trend of rail stock prices over 21 overlapping periods from 1830 to 1930 were greater than normal variations.

In an interesting analysis of the relation of stock prices to the earnings of companies, Dr. Charles F. Roos found that the coefficient of variation tended to be less for highly priced than for lower priced stocks. As to the relation of stock prices to earnings, it was found that stock prices may fluctuate within wide limits for any given earnings or dividends position, with such external factors as monetary inflation, strikes, or social-reform legislation occupying a dominant role. A review of some leading formulae for representing cyclical movements induced by random causes is discussed. Professor Theodore O. Yntema, in his discussion of the security exchanges, mentioned the desirability of studying the regression between variables not associated with cyclical swings alone.

In the field of commodity price analysis, Professor Holbrook Working divided his research program into a study of the consequences of alternative pricing methods (regulation or free competition), a consideration of the theory of the general price level, and the behavior of commodity prices in the business cycle. Dr. Oscar C. Stine concluded with respect to farm prices that a knowledge of the price history of the commodity is of greater significance for the analyst than theoretical principles or statistical method. Mr. Louis H. Bean, in a suggestive discussion of the relation of the supply of agricultural products to industrial stability, indicated that the negative fluctuation of farm crops in response to lower prices exceeded their positive fluctuation in response to rising prices and that this inequality of price-acreage fluctuation was transmitted on an intensified scale to complementary industries.

Mr. Snyder reaffirms his position that changes in the general price level are directly responsive to changes in the volume of credit. He seems, however, implicitly at least to lend support to a study of particular prices in

cycle analysis, if one may infer as much from his observation that a severe depression (1907 is cited) may occur without a change in the general price level or in the volume of credit. In an interesting series of observations on the determination of commodity prices, Professor Theodore H. Brown makes the observation that "presumably the manufacturer can determine the number of units which he will supply and at the same time can set his price within wide limits." An explanation of this peculiar departure from the conclusions of economic theory is not provided.

Among the several lectures dealing with mathematical applications in economic theory, Professor Edward V. Huntington discusses the use of the method of postulates in the social sciences, and Professor Ragnar Frisch adapts the postulational device to his theory of the general choice-field. Following the postulational method of classifying observed systems according to their logical structure, Professor Huntington points out that, granted certain postulates regarding an economic system, conclusions may be reached as precisely in economics as in the field of applied science. Professor Karl Menger develops a theory of social relations based on the dissimilarities as well as the likenesses of individuals and groups. The theory would provide a basis for broadening the field of choice between different aims. In Professor Davis' second lecture, various attempts to deal with the measurement of utility, income, expenditure, and saving are developed. A selected bibliography on the theory of utility is provided. Dr. Jacob Marschak and Professor Gerhard Tintner also contributed lectures on the theory of utility.

The theory of variance and its application to two or more dependent variables, index number bias for various types of averages associated with different weighting techniques, and Professor Felice Vinci's derivation of a measure of the so-called external appreciation of money are other problems discussed and solutions offered.

In the abstracts of the three popular lectures which conclude this report, Professor Rogers places emphasis upon the dollar devaluation program of the Roosevelt Administration as a means of preserving a long-run cheap money policy. Dr. Fry comments on the usefulness of the theory of probability as a substitute for empirical study in the operational problems arising in the telephone industry. Mr. Snyder points to the parallelism between the mechanization of American industry, the amount of capital invested therein, and the rise in the rate of wages received by the American worker. He concludes "it is almost solely through the profits of industry that the new capital, and especially the new capital for new industries, is derived . . ." This being true the implications for current tax policy seem obvious.

Valuable as a report of this character is for one who would keep abreast of the work of the leaders in the field of econometric science, greater unity of purpose as regards the findings of the conference lectures would seem to be desirable.

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Elements of Statistical Method, by Albert E. Waugh. New York and London: McGraw-Hill Book Company, Inc. First Edition. 1938. xv, 381 pp. $3.50.

This textbook, according to the preface, was planned not with the idea of laying a foundation for statistical work in business, biology, or any other particular field, but rather "to introduce the student to statistical concepts and statistical nomenclature and to get him to think in statistical terms." This plan has been followed conscientiously and ably by Professor Waugh. Teachers whose courses are designed for similar purposes may well be grateful to him for a presentation which achieves exceptional clarity without sacrificing precision. Statistical concepts are explained in terms which can be readily understood by the nonmathematically minded, yet there is plenty of food for the thoughts of the abler student of mathematics.

The book begins with two short chapters entitled "The Nature of Statistics" and "The Meaning of Numbers," respectively. The content of these chapters would probably fail to justify, in the eyes of the thorough scholar, the implications of the titles. The first chapter contains a description of the "experimental method," an example of a problem which cannot be solved by that method, a very generalized statement of the purpose of statistical methods, and some "preliminary admonitions" concerning the dangers of trying to carry statistical methods too far. No attempt is made to present a rigorous definition of statistics, statistical methods, or the types of problems to which statistical methods are applicable; nor is there any sort of general description or classification of statistical methods. The chapter on "The Meaning of Numbers" is even more restricted in scope, being limited to a concise explanation of the concept of significant figures, with illustrative examples. Whether rightly or wrongly named, however, these chapters present plainly and forcefully some fundamental ideas which are extremely important to the beginner in statistics.

The third, fourth, and fifth chapters are concerned with frequency distributions and the statistical measures used in analyzing them; the sixth is given over to a discussion of probability theory, the normal curve, and moments. The concept of standard error and its application to various statistics is taken up in the seventh chapter; time series, regression equations, and index numbers in the eighth. The next three chapters are concerned with simple linear correlation, simple curvilinear correlation, and multiple correlation, respectively. The two final chapters deal with problems of "tabulation and graphic presentation" and "collection and analysis of data;" they are largely nontechnical in nature.

Throughout the book the exposition of statistical principles is aided by the presentation of well-chosen examples from various fields of statistical work. At the end of each chapter exercises for the student are presented. Some of these use hypothetical and oversimplified data, to aid in clarifying fundamental concepts without introducing arithmetical complications, whereas others are actual problems from business, economics, or science. As the author points out, most teachers will want to supplement these problems with a separate laboratory manual or with other problems taken from

the daily press and other current sources. Among the problems presented in the book, there is an unfortunate lack of the type whose solution involves a choice of method, or the fitting together of several parts of the technique expounded in the text.

The author has not attempted to include mathematical proofs and derivations for all of the formulae which he introduces. On the other hand, the presentation cannot be described as nonmathematical. It assumes a knowledge of college algebra and considers in some detail several of the simpler mathematical aspects of statistical methods.

It is inevitable that a presentation which purposely avoids emphasis on any one branch or application of statistics should fail to satisfy completely those who have special interests in a particular field. The teacher who adheres to the belief that a statistician cannot make effective use of tools the mathematical justification for which he does not understand will not be satisfied with Professor Waugh's technical treatment. The economic statistician is likely to be disappointed in the small space allotted to the problems of index numbers. The teacher of business statistics will wish for a more thorough treatment of time series analysis and will probably notice also that practically no mention is made of statistics as a means of control. The business statistician and the biometrician alike may wish that the author had seen fit to include some discussion of planned experiments and the methods of analysis applicable to them. These objections, however, may well be more than offset, in the eyes of many teachers of specialized courses, by the exceptional clarity of Professor Waugh's exposition.

It is a source of regret to the reviewer that it is necessary to teach courses in elementary statistics which avoid concentration either on the mathematical aspects or on any particular practical application. A group of students having widely divergent interests in the subject of statistics, or having very little interest of any kind in it, can hardly derive the same benefits from the study as a class which has a more or less definite and uniform purpose. That such mixed courses are a seemingly unavoidable part of the curriculum in many colleges is, of course, no fault of Professor Waugh. He has recognized the widespread existence of these courses and has provided a text, carefully planned and ably executed, to fill their needs.

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How to Use Pictorial Statistics, by Rudolf Modley. New York and London: Harper and Brothers. 1937. xviii, 170 pp. $3.00.

In his book Rudolf Modley traces the history and development of the method of pictorially presenting statistical data, giving due credit to its founder Otto Neurath. Anyone interested in presenting data in graphic form, irrespective of the method to be used, would do well to read this book. The rules Mr. Modley lays down for building a pictorial chart also apply to

more formal types of presentation. He stresses simplicity and the fallacy of attempting graphically to present too many variables on one chart, and he does well to point out that the pictorial method is limited only by the complexity of the data. Methods of presenting various kinds of data are discussed and in most cases are adequately illustrated.

It is emphasized that symbols should be designed to speak in terms that are comprehensible and for this reason a symbol for a given subject should vary depending upon the specific audience in mind. "The American and the Chinese farmer dress differently and use different tools; the symbol for a farmer in America will, therefore, vary from the symbol for a farmer in China." After seeing some symbols used by Mr. Modley, I doubt if he has entirely alienated himself from the European influence.

The book fails to cover one very important factor involved in making pictorial charts. It is extremely difficult, at the present time at least, to obtain the services of an artist who has had training in this method of presenting statistics. Mr. Modley is undoubtedly aware of this problem, however, for he has made available various symbols (some are carelessly drawn, I believe) which may be purchased. Ready-made symbols, however, are not a solution. For effective presentation, each class of data must be represented by a particular symbol.

This book, insofar as the reviewer is aware, is the first of its kind and points the way to a method of presenting for popular appeal interesting material heretofore found only in technical publications.

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Studier över Tallens Fysiologiska Variabilitet och dess Samband med Klimatet, Ett Bidrag till Kännendom om tallens Ekotyper (Study of the Physiological Variability of Pine and Correlation with Climate, A Contribution to the Knowledge of Pine Ecotype), by Olof Langlet. Stockholm: Meddelanden från Statens Skogsförsöksanstalt. Heft 29, Nr. 4. 1936. pp. 219–406. Numerous text figures and a bibliography of 375 titles. In Swedish with a full German Summary.

This paper is another publication from the Swedish Forest Experiment Station that is well worth reading. The plant and tree physiologists will find it valuable as a contribution to the literature on the relationships between the physiological variabilities in plants (here *Pinus sylvestris* L.) and climate, both when planted in the place of origin of the seed and in other localities. Other scientists will find it a well-grounded, excellently prepared and presented piece of research.

The paper was Dr. Langlet's doctoral dissertation. The criticism which has previously been made that the research was based on dry substance in the plant and did not include some other lines of work does not, in the opinion of this reviewer, detract in the least from the value of the research.

Dr. Langlet summarizes in the first three chapters the work of many others on the subjects of: the provenience (locality) question development; physiological foundation of cold hardiness in plants; and the annual variation of different substances in the plant cells and the correlation between these substances and cold hardiness. From this previous work he concludes that his study shall be based on dry substance content in the plant.

The research covers the period 1928–35. Much of the work was done at the State Forest Experiment Station near Stockholm, where pine plants from seed from several hundred localities were planted. Some of the planting was done also in other parts of Sweden.

Analysis of the data in the fourth chapter, which covers the quantitative physiological differences between pine plants of different localities, leads to the following general statements: Plants of northern descent are characterized in fall and winter by a comparatively high dry substance content (in percentage of fresh weight), sugar (in percentage of wet weight), material extracted with petroleum ether (in percentage of dry weight), as well as catalase. At the same time these plants showed a lowering of the total nitrogen (in percentage of dry weight), but against that was found a higher content of "växttråd" (I translate this as plant fibers, since the author states that they are composed mostly of cellulose and lignin) (in percentage of dry weight), and substances extracted with weak acid and alkali (in percentage of dry weight).

Investigations on one-year-old pine seedlings and on needles from older pine trees indicate that the content of dry substance and sugar rises in the fall and is high during the winter but sinks in the late winter and early spring. Sugar content was found to be higher in one-year-old seedlings than in the needles of older trees.

Pine plants from northern stock showed a more or less intense winter coloring. This, in the leaves of older plants, and in the case of yellow coloration intensity, is proportional to the chlorophyll content of the leaves.

In dealing with investigations of pines from various localities, planted in places where there was a different climate, Dr. Langlet points out that the pines from the northern localities develop their needles earlier in the spring than do the trees grown from seed from southern stock. The time of development of the needles shows a strong correlation with dry substance content. That is, the higher the dry substance content, the earlier in the spring the leaves of the plants develop. Summing up these data, it is concluded that "dry substance content is a value easily arrived at and characteristic for pine plants from different localities. It indicates their physiological variabilities such as the overwintering ability, growth form, rate of growth, periodicity, etc."

In the study of the correlation between dry substance content and climate of the original home locality of the plants under investigation, meteorological maps were prepared showing the total number of days in a year with an average normal temperature of plus 6°C. or over; the average temperature of the warmest months; and the spread between the average temperature of

the warmest and coldest months. A statistical investigation of the data shows that the dry substance content of pines from a known region can be regarded as a function partly of the latitude of the locality, partly of the length of the vegetational period. In the latter case is meant the number of days per year with a normal average temperature of plus 6°C. or over. This number of days with an average temperature of plus 6°C. or over is for Sweden (with the exception of the west coast) a function of the latitude of the locality and its height above sea level.

In the final chapter, a combination of the forest planting results and the plant height which can be expected from the use of pine seed from various localities in different places has been projected in the form of three-dimension graphs. A diagram of this type permits a lucid exposition of the results of removing pine seed from one part of the country to another, in that the results of different combinations of places and seed localities can be directly compared.

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Social Saga of Two Cities, An Ecological and Statistical Study of Social Trends in Minneapolis and St. Paul, by Calvin F. Schmid. Minneapolis, Minnesota: Bureau of Social Research, The Minneapolis Council of Social Agencies. Monograph Series No. I. 1937. xvi, 418 pp. $3.50.

In reading Calvin Schmid's book, one is reminded of the life of Loewenhoek, the inventor of the microscope. Loewenhoek, after having discovered a new means of observing and studying life, brought it to bear somewhat indiscriminately on all objects small enough to be put on the slides of his microscope. Likewise, Mr. Schmid has seemingly drawn into his ken every variety of social phenomena available in Minneapolis and St. Paul that would lend itself to statistical analysis. The result is a substantial volume of 218 charts and maps and approximately 200 pages of text presenting a panorama of the social and economic life of the Twin Cities in so far as they can be mirrored by the statistical techniques employed.

This wealth of information is grouped under four major headings: (1) the growth and expansion of the two cities; (2) the population trends; (3) housing conditions as portrayed from the data collected in the Real Property Inventory; and (4) a miscellaneous assortment of statistics dealing with social and personal disorganization. Very little of the data are presented in tabular form. Consequently, the text, which attempts to embrace an elaborate array of statistical information, is difficult reading. This difficulty is, to a certain extent, offset by the generous inclusion of excellent charts and maps, telling the general story of trends, distributions, and relationships with a high degree of effectiveness.

One is likely to read Mr. Schmid's study with mixed emotions. First of all, one is impressed with the meticulous care and thoroughness of the author

in presenting the many available data for the ecological study of an urban community. One is likewise impressed, however, with the significant gaps in the information. A number of important items are omitted apparently either because they were not available or because their inclusion did not fit in with the time and scope of the study. For example, there is very little if any reference to the volume of service rendered by public or private social agencies. This is doubly strange, inasmuch as the study was published by the Minneapolis Council of Social Agencies. Likewise, there is a very meager treatment of vital statistics, although these data are of the utmost significance in evaluating both the social and economic characteristics of the community as well as the attitude of the community in tackling its problems. These sins of omission can readily be forgiven because of the excellence in treatment of such data as are included.

The first part of the book, that dealing with the growth and expansion of the two cities, will probably be the most interesting and valuable to those readers not residents of Minneapolis and St. Paul. It includes a wealth of statistical and historical material illustrating the rise and development of the area. A great deal of space is justifiably given to the growth and decline of various occupations and industries. Considerable emphasis is placed upon the development and changes in the means of communication and travel. Particularly interesting is the chapter devoted to the study of the evolution of property uses in the various sections of the city, tracing the shifts in merchandising centers, the migration of hotels, churches, and theaters. The spread of the residential community from the original cluster of downtown sites to the present suburban areas is effectively emphasized with charts illustrating the development of streetcars and paved streets. The influence of the use of the automobile as a means of communication and travel is effectively correlated with the analysis of the expansion of the residential areas. Throughout this section the maps used to illustrate the author's thesis are excellent models in the graphic presentation of one of the most fascinating problems of urban life and one of the most difficult essays to show adequately.

The second section of the book is devoted to the analysis of the changes in the population by sex, age, race, nationality, and size of family. In this there is little that is novel or significantly different from the number of similar studies made of other urban communities. It is worth while to call attention to the treatment of one of these problems; that is, the distribution of the Jewish population based upon data available from a local housing survey. Any study which adds to the knowledge of this rather difficult and nebulous subject will be welcomed by the students of urban sociology.

The third section, which is devoted to an analysis of the Real Property Inventory of Minneapolis and St. Paul, contains one very important contribution. The inter-relationships of the various criteria used in the Real Property Inventory have been evaluated by the coefficients of correlation. Although the relationships discovered in this analysis may not hold true for other urban centers to the exact degree indicated in this volume, neverthe-

less they are sufficiently provocative to warrant similar analyses for other communities where the same data are available.

The fourth section, comprising the last 100 pages, is devoted to a rather miscellaneous group of studies including marriage and divorce rates, crime statistics, prostitution, venereal disease, and suicides. The treatment of these series contains nothing unusual either from the point of view of methodology or results, but they add greatly to the value of the book as a reference for the students of the area.

What Calvin Schmid has done is to carry out the ambition of most persons interested in the social research of a given community. He has embodied in one volume as comprehensive and as concise a statement as is possible of the variety of pertinent data that are necessary to picture the social evolution of an urban community. He is particularly to be congratulated for the skill with which he has incorporated the work of students in his classes and in turning the requirements for the fulfillment of the candidacies of a degree into a useful source book for the community.

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A Social Study of Pittsburgh, Community Problems and Social Services of Allegheny County, by Philip Klein and Collaborators. New York: Columbia University Press. Published for the Social Study of Pittsburgh and Allegheny County. 1938. xxviii, 958 pp. $4.75.

This volume represents a comprehensive and scholarly appraisal of social work in the city of Pittsburgh and the remainder of Allegheny County against the geographical, political, economic, and social matrix of the community. It belongs to the type of study which has come to be known as a social survey, but it is not a sequel to the Pittsburgh Survey made almost three decades ago. " . . . the present study itself was designated a 'social study' rather than a 'survey' in deference to a persistent resentment of the activities associated with the famous Pittsburgh Survey, which laid bare some of the social costs of the precipitous pursuit of power and wealth" (p. 290). In comparison to the original Pittsburgh Survey, the present study is more even-tempered, objective, and thorough. Moreover, in its accuracy and completeness, its scholarly analysis and judicious weighing of the facts, *A Social Study of Pittsburgh* sets a very high standard indeed.

The study was initiated in 1934 by a local "Citizens Committee," appointed in equal numbers by the Federation of Social Agencies and the Community Fund. The Buhl Foundation provided a subsidy of $85,000 for this undertaking, while many other local organizations, especially the Bureau of Social Research of the Pittsburgh Federation of Social Agencies, the Bureau of Business Research of the University of Pittsburgh, and the Pittsburgh City Planning Commission provided valuable assistance and

materials. This volume is fundamentally a cooperative effort. Throughout most of the work Dr. Klein was assisted by a large staff of able and experienced workers. Although many people have collaborated in organizing the material and writing the original chapters, the completed volume is thoroughly unified and clear, and fairly readable.

One of the most unique and significant characteristics of this study is the excellent analysis of the physical, economic, and social setting of community life in Allegheny County. Approximately one-third of the report is devoted to this phase of the problem, and the remaining two-thirds is concerned more directly with an evaluation of social work in Allegheny County. This phase of the study correctly emphasizes the importance of understanding the historical, geographical, political, economic, and social forces which have molded the life of the community as a prerequisite to an accurate understanding and interpretation of social work services. More specifically, Part I includes a general historical and descriptive survey of Allegheny County and its constituent communities; an analysis of the basic industrial trends, wages, employment, and unemployment in Allegheny County; a summary of progress in social legislation and labor organization; a study of housing conditions among the wage earning classes; an interpretation of the more significant characteristics of ethnic and racial groups; a socio-psychological survey of attitudes and public opinion, and a study of changes and trends in the public school system of Pittsburgh during the past quarter of a century.

In many ways the first part of this study is comparable to the recently published and well-known volume, *Middletown in Transition*, by Robert S. Lynd. *Middletown in Transition* is a survey of Muncie, Indiana, an industrial community very much smaller than Pittsburgh. The Muncie study covers a wider field but is more impressionistic and journalistic in style. It has a very broad appeal. On the other hand, the survey of Pittsburgh is more thorough and objective but less readable. Its appeal will be confined largely to the professional social scientist and social worker. Perhaps it would have been a real advantage—except for the cost differential—to have published Parts I and II of *A Social Study of Pittsburgh* in separate volumes. At the present time the study is somewhat forbidding in its make-up—the type is relatively small, the chapters are long, and the entire report comprises close to 1,000 pages. The social scientist will be very much interested in Part I, but it is very doubtful if he will read Part II. Of course, the social worker will be mainly interested in the second part.

As an illustration of the type of material in Part I, as well as some of its implications for the larger study, let us consider very briefly Chapter III on "The Chances for a Living in Allegheny County." This chapter is based on a special report prepared by Dr. J. P. Watson of the Bureau of Business Research. Of the twenty-one chapters that comprise the study, this chapter is one of the best. Although many of the facts and interpretations are tentative and the connection between the problems discussed and the demands which they create for social service are not always obvious, nevertheless this

chapter as well as all the other chapters in this section represent an excellent analysis of the economic and social life of this community.

During the past decade or more the opportunities for employment in the Pittsburgh area have definitely lagged behind the growth of population.

> Data on the activities of the State Employment Office and thirteen private employment agencies show convincingly that in Pittsburgh the ratio of the number of jobs to the number of applications for jobs was falling drastically long before 1929. It was the opportunity to work, not the willingness to work, that dried up—and that was in "good" times (p. 118).

It is further pointed out that in 1929 when employment conditions reached the highest level known, approximately 5 per cent of the workers were without employment. The lowest level of employment occurred in March, 1933, at which time close to 40 per cent of the workers were unemployed.

The Pittsburgh district had a period of very rapid industrial growth in the latter part of the last century, but in recent years the rate of growth has slowed down to such an extent that the district has the appearance of practical maturity. The district has been known as a production district. The trend of production and the trend of population have become more and more nearly parallel, but with the recognized growth of efficiency of production, a parallel between the trend of production and the trend of population means a decline in work per capita in the production industries.

As far as certain types of industries are concerned, some have increased in relative importance, some have settled toward a level, while others have declined. In this connection we find that the index of total iron and steel production in the Pittsburgh district was only a little higher in 1929 than in 1916 and that coal production reached a distinct peak in 1918 and has since noticeably declined.

In addition to the analysis of unemployment associated with the trends in production and changes in basic industries, as well as with the business cycle, consideration is also given to seasonal fluctuation in business as a factor in the irregularity of work.

Although employment is of utmost importance in the economic well-being of the worker, there is also the question of sufficient earnings. Does the worker earn enough during the periods of actual employment to provide a reasonable average income over the year? How many others besides himself depend upon the worker for support?

> It must be clear to the most reluctant observer of these figures that poverty is rampant in the industrial environs of Pittsburgh even in what we have called normal times: that poverty by whatever name we choose to designate the frequent occurrence of economic distress in the working population is the chief social problem of life; that it necessarily confronts the community, not only in the direct need for assistance, but also in distressing conditions of housing and health, in precarious morale, in subversive social attitudes. (p. 156).

Part II of *A Social Study of Pittsburgh* is devoted directly to an analysis of social work. Because of limitation in time and budget as well as for practical considerations, certain phases of social work were arbitrarily omitted,

for example, courts (except the Juvenile Court), penal institutions (except certain ones for children), employment services, the problem of the handicapped, the technical aspects of mental hygiene, and the pastoral work of churches.

This section of the study includes analyses of the following questions: the cost and support of social work; the planning and co-ordination of social work; the personnel of social agencies and the facilities for professional training; the general problem of relief, social case work and the characteristics and policies of agencies providing relief; the problem of personal adjustment as a task of social agencies where economic dependency, if present, is not the principal difficulty; social work for children; the organized care of the sick and public health administration; and facilities and programs for leisure-time activities. An "Epilogue," written a year and a half after the completion of the field work, constitutes the final chapter of this volume.

A summary of the principal recommendations presented to the Citizens' Committee are to be found in Appendix B. The essential phases of the recommendations, as well as occasional selected details, have been incorporated in the report in the various chapters and divisions of dealing with the several subjects of the inquiry. The recommendations are of course in varying degrees subjective.

> Facts do not always lead to one conclusion alone; recommendations are compounded of opinion, as well as of facts, and opinions may differ; expertness of opinion is conditioned not only by the specialist's previous experience, but also by the acceptability of his recommendations to the interested party (p. 878).

From the 10 pages of closely printed recommendations, let us select a few for special examination:

> Admission of Negroes to all hospitals and sanatoria on equal basis with white persons.
>
> Transfer all hospitals from present city and county authorities to new Department of Hospitals, except control of contagious disease hospitals by Health Department.
>
> Extend the inspection and licensing power and duties of the State Department of Public Welfare to all hospitals, maternity homes, institutions for chronic patients and convalescents, clients and out-patient departments, whether conducted under public, philanthropic or profit-making auspices.
>
> Recognize that relief must become, and to all intents and purposes is now, a public function . . .
>
> Establish a general nonsectarian case work agency for Pittsburgh and Allegheny County. The functions of the Family Society, Children's Service Bureau and the Children's Aid Society, would be transferred to this organization. These three agencies would then cease to function and would transfer their physical property and personnel, with the exception of executives and board members, to the new agency.
>
> Create a County Department of Public Assistance with complete responsibility for all matters of relief, indoor and outdoor.
>
> Administer all categorical relief through appropriate divisions within this department and transfer to it the Mothers' Assistance Fund, Blind Pensions, and Old Age Assistance.

As Dr. Klein points out, there is a deep-seated series of paradoxes which complicates the logical process from fact to conclusion and thence to recom-

mendation and acceptance. Will there be a serious attempt to follow at least the more important of the recommendations of this study? Many of the recommendations propose far-reaching changes—the merger and even the discontinuance of some agencies, changes of policy, modification of programs, new orientations, and the elimination of one function and the assumption of another. Of course, many agencies will attempt to discredit the findings of the study and strongly resist any attempts to carry out certain of the recommendations. Although only a brief time has elapsed since the completion of the study, several of the recommendations by the agencies affected have been accepted and decisive steps have been made for putting them into effect. What the ultimate result will be one cannot possibly predict. Nevertheless the study itself is a genuine contribution to social work administration not only in Allegheny County but throughout the country, and the conclusions and recommendations represent a real challenge to the present programs and concepts of social work.

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Man and Society, A Substantive Introduction to the Social Sciences, edited by Emerson P. Schmidt. New York: Prentice-Hall, Inc., 1937. xv, 805 pp. $5.00.

Written as an introduction to social science for the college orientation course, this volume is reviewed here from that point of view. The work is divided into sixteen chapters as follows:

1. Sociology and Culture, Elio D. Monachesi; 2. Social Institutions, J. O. Hertzler; 3. Social Anthropology, Wilson D. Wallis; 4. Social Psychology, Herbert Blumer; 5. Psychology and Some of Its Applications, Howard P. Longstaff; 6. Modern Criminology, George B. Vold; 7. History, Lawrence D. Steefel; 8. Human Geography, Richard A. Hartshorne; 9. Elements of Political Science, Evron M. Kirkpatrick; 10. Popular Participation in Government, Joseph R. Starr; 11. The Machinery of Government, Joseph R. Starr; 12. The Economics of Price, Emerson P. Schmidt; 13. The Distribution of Income, Emerson P. Schmidt; 14. Economic Security, Emerson P. Schmidt; 15. Causal Relationships and Their Measurement, Richard L. Kozelka; 16. Social Valuation, Mary J. Shaw.

The reviewer believes that *Man and Society* is a good book in its field. It compares favorably with the best books now available for use in orientation courses to social science. The subject matter of the book is not as inclusive as one would desire. There is very little material on education, religion, recreation, art, and the family. These subjects should either have been treated as separate social science fields or at some length under sociology or social institutions. Since education is an extensively developed field, it probably merits a separate consideration.

There is no uniform approach to subject matter in the major divisions of the book. Consequently, the reader cannot predict which aspects of a given

subject will be treated. Three examples of this will indicate the point. First, each field is defined, except economics. Second, there may or may not be a discussion on the applied phase of a given subject. Third, in each field except history, the author deals extensively with the facts and theories of the field. The author of the chapter on history has omitted the facts and the theories, even though the preface to the volume states that: "The aim of the present volume has been to acquaint the reader with the core of knowledge in each of the social sciences" (p. v).

A number of inadequate theories are stated in various places. The chapter on "Psychology and Some of Its Applications" contains various mistakes. Three of these are cited here. First, the author claims that he " . . . adheres to the opinion that intelligence is relatively impervious to environmental influence . . . " (p. 238). After this claim, he discusses the researches which support his view and omits several studies which do not support his view. A second mistake, which is related to the first, is the belief that research evidence has accumulated which indicates racial differences in intelligence. Several uncritical studies are presented in support of this theory (pp. 240–41). Finally, the author accepts "dysgenic" family histories, such as the Kallikak, without any question of their validity (pp. 242–44).

One additional matter calls for special attention. In the chapter on economics, one will not find anything which approaches an adequate discussion of capitalism and the problems associated with it. This important subject is treated superficially. In the chapter on "Economic Security," the author considers "attempts to improve economic well-being and to create greater economic security for specific groups" (p. 637). No reference is made to a comprehensive and systematic form of social planning.

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A Manual of Archive Administration, by Hilary Jenkinson. London: Percy Lund, Humphries & Company, Ltd. 1937. New and Revised Edition. xvi, 256 pp.

The last five years have witnessed a notable expansion of archival activity in the United States. The establishment and rapid development of The National Archives; the erection of the Maryland Hall of Records and a new building for the Illinois State archives; the far-flung activities of the Historical Records Survey of the Works Progress Administration in inventorying and improving the condition of State, local, and church records; the Survey of Federal Archives outside of Washington (another W. P. A. project); and finally the organization of the Society of American Archivists, with a membership of over 250, are incontrovertible evidence that archival economy, or "archive administration" as Mr. Jenkinson calls it, is at last being domiciled in the United States.

It behooves the American archivists and would-be archivists, of course,

to familiarize themselves with the principles and practices of archival economy that have emerged from over a century of European study and experience, but unfortunately many of them cannot read with facility the systematic treatises on the subject that are available in various Continental languages. Jenkinson's *Manual*, the only work of the sort in English, was first published in 1922, but it has been out of print for a number of years; and this new and revised edition will receive a hearty welcome in all English-speaking countries. As an Assistant Keeper of the Records in the Public Record Office and as Reader in Diplomatic and English Archives in the University of London, Mr. Jenkinson is in close touch with English experience, and he has evidently made a considerable study of the Continental literature.

The book is divided into four parts and a number of appendices. The first part is devoted largely to a discussion of the nature of archives, which leads to the conclusion that "A document which may be said to belong to the class of Archives is one which *was drawn up or used in the course of an administrative or executive transaction (whether public or private) of which itself formed a part; and subsequently preserved in their own custody for their own information by the person or persons responsible for that transaction and their legitimate successors.*" The second part deals with the "Origin and Development of Archives and Rules for Archive Keeping" and contains detailed suggestions for the physical care of records, for organizing and arranging the groups or classes in such a manner as to preserve their integrity, and for the making of guides, descriptive lists, calendars, and transcripts. Parts 3 and 4, entitled "Modern Archives" and "Archive Making," are devoted largely to a consideration of the archival problem involved in the enormous quantities of records that are now being preserved. The author feels that it is the business of the archivist to preserve records, not to destroy them, and that the solution of this problem must be sought in the prompt destruction by the agencies concerned of material deemed useless for administrative purposes without regard for its possible future value for historical or other scholarly purposes. There can be no question that the archivist alone cannot solve this problem, but it would seem that some consideration should be given to extraneous values. If only records having permanent administrative value had been preserved in the past, much of the most valuable archival material would not now be in existence.

Valuable as it is, the book does not entirely meet the needs of American archivists. The principles of archival economy may be universal, but their application varies with the varying character of records of different periods and countries. Archivists in the United States rarely need to know how to care for medieval rolls, but they frequently need to know what to do about enormous masses of raw data such as census schedules and replies to questionnaires; they seldom have occasion to clean and repair parchments, but they need information about efficient and inexpensive methods of fumigating, flattening, and rehabilitating vast quantities of modern papers. A manual

of archival economy designed to meet these and other needs of American archivists is a desideratum. Doubtless it will appear in the fullness of time.

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Group Hospitalization, A Report Prepared by the Bureau of Medical Economics, American Medical Association, Chicago, Illinois, 1937, 296 pp.

The report opens with a brief review of the background of group hospitalization plans in which these schemes are distinguished from the traditional fee-per-patient methods of payment for hospital services. Then will be found discussions relative to a distinction between industrial health services and medical service systems, the beginnings of hospital plans, the British contributory and provident hospital schemes, and the essential characteristics of these forms of insurance. The forces behind group hospitalization are next considered, and the primary motive is found to be, strangely enough, not a response on the part of the hospitals to the need of the public to guard against the unforeseen necessities of expensive hospitalization but rather "the bolstering of hospital finances" (p. 30). The study does find, however, that "the promotion of bona fide group hospitalization plans also had the desire to furnish hospital facilities on more equitable payment arrangements for patients with limited means" (pp. 30–31), so public demand is found to be a factor in this development, although not the most important one.

Next a record of "principles and approvals" of such plans is set forth presenting attitudes and official action of such medical bodies as the American Hospital Association, the American College of Surgeons, and the American Medical Association. The last-named body, so the reader is told, through the *Journal of the American Medical Association*, carefully discussed the pros and cons of hospitalization insurance schemes and "listed fifteen prospective defects as against four merits of such plans" (p. 33). The way in which organized medicine may judiciously guard against the pitfalls of any plan that smacks of "medical insurance" is cleverly suggested in this discussion by a reproduction of a resolution adopted by one state association. The last paragraph of this "example" reads:

> "Therefore, the Council recommends that any component society of the . . . State Medical Association refuse sanction to any hospital insurance project until complete study has been made by the county medical society, and until pertinent data have been submitted to, and acted upon, by the Council of the . . . State Medical Association" (p. 39).

This growing interest in group hospitalization finally impelled the House of Delegates of the American Medical Association to set forth, in 1934, ten principles which this body felt should govern experiments for organizing medical and hospital services. The report hastens to add that although

"these principles have been lightly referred to as the 'Ten Commandments' of the American Medical Association," nevertheless "their usefulness and importance have been demonstrated" (p. 40). No concrete evidence, however, can be found in support of this claim.

The statistical part of the report in which 16 tables are presented sets forth the result of a survey conducted between October, 1935, and March, 1936, when every locality in the United States where a group hospitalization plan was thought to be in existence was presented with a series of letters and schedules. Of the 199 organizations upon which information was available, only a few were in operation and reported sufficient data to be usable, so the analysis of necessity is largely a case study analysis. This part of the study, in the mind of the reviewer, represents a helpful contribution to the literature in this field so far as it describes objectively the organization, administration, financial policies, sales and promotion programs, hospital benefits and rates of charges of typical plans, and presents an analysis of the growth in membership of the various schemes.

The study then passes on to a consideration of the relationship of group hospitalization to the practice of medicine in which the interest of the doctor is stressed as being of fundamental importance to all types of health and hospital services. A note of warning is here sounded inasmuch as all group hospitalization plans "place hospital service corporations in control of the services of individual hospitals and interfere with medical practice in hospitals," thus leading to undesirable practices such as "the solicitation of patients, the entrenchment of nurse anesthetist, the placing of more and more of the practice of radiology in the hands of incompletely trained lay technicians, and the forcing of pathology from its rightful position in the practice of clinical medicine" (p. 199). A continuation of these practices, it is thought, will soon subjugate the medical profession to the dictates and control of hospital service corporations, and this will inevitably lead to the destruction of the professional practice of medicine. "Hospitals are entirely dependent on physicians and should strive to serve them by offering improved facilities and educational opportunities to better their skill. To attempt to control or to employ physicians will lessen their initiative and self-reliance and will adulterate the quality of the service they render" (p. 200).

After a brief comparison of accident and health policies with group hospitalization contracts, the book ends with the general contention that "group hospitalization is neither a simple, direct method of paying for hospital bills nor a solution to the economic problems of hospitals and patients alike" (p. 230); and a postulation of "principles" in which the traditional selfish claim so often repeated is once again restated: "the decision as to whether or not a group hospitalization plan is essential must rest primarily with the medical profession and the hospital officials of the local community" (p. 246). Lest the public citizen should by happenstance think that his voice were worthy of some recognition in the solution of this important problem of medical costs, the case for the American Medical Associ-

ation is clinched by a full recitation of the "Ten Commandments" (pp. 247–48), and a reminder that the House of Delegates of the American Medical Association is a democratic organization and has called particular attention to the "Fourth Commandment" which says that "the subscriber's contract shall (should) exclude all medical services—contract provisions shall (should) be limited exclusively to hospital facilities" (p. 247).

It is extremely difficult to appraise objectively a work that is so lacking in objectivity. The report has "an axe to grind"—it is in defense of private medical practice and organized medicine, and the "grinding wheel" is in motion throughout most chapters of the book. The pattern of the report is not clearly set forth; it is difficult for the reader to gain an idea of the scope and method of presentation—but its general purpose cannot be missed. Many statements are set forth without supporting evidence; many others fail to carry the necessary references which permit further checking. (Cf. pp. 10, 11, 12, 30, 31, 147, 149, 154, 159, 162, 163, 165, 191, 206, 235, 238, 241, 242, 243, 244, 246, 249.)

In other cases certain data presented cannot be relied on. For instance on page 13 it is stated that "it was found that the cost of practicing medicine in private practice varies from 27 to 34 per cent of gross income," et cetera, when in fact one of the most comprehensive studies yet made for any state has shown the ratio of gross income devoted to expenses during 1933 to be 45.4 per cent (California Medical Economic Survey, 1937, p. 106). Again (p. 14) the American Medical Association is given as partial authority for the statement that "the claimed economics of group arrangements do not seem to materialize, because, in spite of uncertain accounting methods, the reported cost per student is not *appreciably less* (italics the reviewer's) than the cost for similar services in the private purchase of medical and hospital care." This statement is made in spite of the fact that the United States Department of the Interior, Office of Education in its *Student Health Services in Institutions of Higher Education*, Bulletin No. 7, 1937, offers numerous specific cases to the contrary.

Another serious defect of the work relates to the statistical analysis of the various hospitalization plans. In this analysis, comparisons are made throughout upon a basis of the *number of plans*, although one of the tables presented (Table 8, p. 91) shows that the membership of respective plans varies all the way from 118 to 216,195, the largest three plans accounting for almost half of the total membership of the 49 plans upon which information was available. Also some inaccuracies of statistical comparisons are to be found (cf. last sentence in the first paragraph on p. 105).

Open to most severe criticism, however, is the evaluation presented throughout the report relating to the basic principles of insurance (found especially on pages 146 to 159, and 241 to 249). In analyzing the cost of hospitalization schemes to the subscribers the authors argue:

> "For the subscriber, the plan offers one hospitalization at $50 in return for $90 collected in premiums. On the basis of anticipated hospitalization experiences, it is expected that each subscriber will be hospitalized once in ten years. From the financial point of view, an income of $90 ($9 annually

for ten years) is received from each subscriber, in return for which the expenses of one hospitalization are expected to be paid. The cost of this hospitalization is, as reported, about $50. The difference of $40 is for administration, promotional expenses and reserves."

So it is demonstrated how much better off the sbuscriber would be to remain out of the scheme and experience only the *average* hospitalization costs. But he is not told how to choose his hospitalization needs so that these *average* costs will be all that he needs at any one time, or during any given period.

Is there any reason to be surprised at the lack of understanding present within the medical profession as long as this type of propaganda is issued? There are sound advantages as well as weaknesses in a system of hospitalization insurance. Both sides need objective analysis. This work, as might be expected, represents an attempt on the part of organized medicine to emphasize the shortcomings and dangers of group budgeting plans for hospital care, and failing this, at least to point out the necessity for such plans to be under the constant vigilance and control of the medical profession. It is another in the long series of free publications of the American Medical Association circulated in defense of privately organized medicine.

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